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October 14, 2005

Ms. Marlene Dortch
Secretary
Federal Communications Commission
445 12th Street, N.W.
Washington, DC 20554

Re: IB Docket Nos. 05-220 and 05-221

Dear Ms. Dortch:

Attached for inclusion in the records of the above-captioned proceedings is the Petition for Declaratory Ruling filed September 26, 2005 by Inmarsat Global Limited ("Inmarsat") (File No. SAT-PPL-20050926-00184). The Petition seeks Commission authority to provide mobile satellite service to the United States using a spacecraft operating at 113° W.L. in the 2 GHz band and the extended Ku-band. Inmarsat is submitting the attached Petition in IB Docket Nos. 05-220 and 05-221 to inform the optimal resolution of, and lead to a more complete record in, those proceedings.

Please contact the undersigned if you have any questions regarding the attached.

Sincerely,

/s/

John P. Janka
Jeffrey A. Marks

cc: Cassandra Thomas
William Bell
Steven Spaeth

Approved by OMB
3060−0678

Date & Time Filed:
File Number: −−−
Callsign/Satellite ID:

APPLICATION FOR SATELLITE SPACE STATION AUTHORIZATIONS FCC 312 MAIN FORM FOR OFFICIAL USE ONLY	FCC Use Only

APPLICANT INFORMATION
Enter a description of this application to identify it on the main menu:
Inmarsat Global 2GHz

1−8. Legal Name of Applicant

Name:	Inmarsat Global Limited	Phone Number:	44−20−7728−1000
DBA Name:		Fax Number:	44−20−7728−1602
Street:	99 City Road London	E−Mail:	
City:		State:	
Country:	United Kingdom	Zipcode:	−
Attention:	Rupert Pearce		

9−16. Name of Contact Representative

Name:	John P. Janka	Phone Number:	202−637−2200
Company:	Latham & Watkins LLP	Fax Number:	202−637−2201
Street:	555 Eleventh Street, NW	E−Mail:	
	Suite 1000		
City:	Washington	State:	DC
Country:	USA	Zipcode:	20004 −1304
Attention:		Relationship:	Legal Counsel

CLASSIFICATION OF FILING

17. Choose the buttonnext to the classification that applies to thisfiling for both questions a. and b. Choose only one for 17a and only one for 17b. a. (N/A) a1. Earth Station ◉ a2. Space Station	b. ○ b1. Application for License of New Station (N/A) b2. Application for Registration of New Domestic Receive−Only Station (N/A) b3. Amendment to a Pending Application (N/A) b4. Modification of License or Registration (N/A) b5. Assignment of License or Registration (N/A) b6. Transfer of Control of License or Registration (N/A) b7. Notification of Minor Modification (N/A) b8. Application for License of New Receive−Only Station Using Non−U.S. Licensed Satellite ○ b9. Letter of Intent to Use Non−U.S. Licensed Satellite to Provide Service in the United States ○ b10. Replacement Satellite Application − no new frequency bands ○ b11. Replacement Satellite Application − new frequency bands (Not eligible for streamlined processing) ◉ b12. Petition for Declaratory Ruling to be Added to the Permitted List (N/A) b13. Other (Please specify)

17c. Is a fee submitted with this application?

○ If Yes, complete and attach FCC Form 159.

If No, indicate reason for fee exemption (see 47 C.F.R.Section 1.1114).

○ Governmental Entity ○ Noncommercial educational licensee

◉ Other(please explain): No fee associated with Petition for Declaratory Ruling

17c. Fee Classification BNY − Space Station (Geostationary)

18. If this filing is in reference to an existing station, enter:

(a) Call sign of station:
Not Applicable

19. If this filing is an amendment to a pending application enter:

(a) Date pending application was filed:	(b) File number of pending application:
Not Applicable	Not Applicable

TYPE OF SERVICE

20. NATURE OF SERVICE: This filing is for an authorization to provide or use the following type(s) of service(s): Select all that apply:

- [ ] a. Fixed Satellite
- [x] b. Mobile Satellite
- [ ] c. Radiodetermination Satellite
- [ ] d. Earth Exploration Satellite
- [ ] e. Direct to Home Fixed Satellite
- [ ] f. Digital Audio Radio Service
- [ ] g. Other (please specify)

21. STATUS: Choose thebutton next to the applicable status. Choose only one.

○ Common Carrier ◉ Non−Common Carrier

22. If earth station applicant, check all that apply.
Not Applicable

23. If applicant is providng INTERNATIONAL COMMON CARRIER service, see instructions regarding Sec. 214 filings. Choose one.Are these facilities:

○ Connected to a Public Switched Network ○ Not connected to a Public Switched Network ◉ N/A

24. FREQUENCY BAND(S): Place an "X" in the box(es) next to all applicable frequency band(s).

- [ ] a. C−Band (4/6 GHz)
- [ ] b. Ku−Band (12/14 GHz)
- [x] c.Other (Please specify upper and lower frequencies in MHz.)

Frequency Lower: 2000 Frequency Upper: 2200 (Please specify additional frequencies in an attachment)

TYPE OF STATION

25. CLASS OF STATION: Choose the button next to the class of station that applies. Choose only one.

(N/A) a. Fixed Earth Station
(N/A) b. Temporary−Fixed Earth Station
(N/A) c. 12/14 GHz VSAT Network
(N/A) d. Mobile Earth Station
(●) e. Geostationary Space Station.
(○) f. Non−Geostationary Space Station
(○) g. Other (please specify)

26. TYPE OF EARTH STATION FACILITY: Not Applicable

PURPOSE OF MODIFICATION

27. The purpose of this proposed modification is to: (Place an "X" in the box(es) next to all that apply.) Not Applicable

ENVIRONMENTAL POLICY

28. Would a Commission grant of any proposal in this application or amendment have a significant environmental impact as defined by 47 CFR 1.1307? If YES, submit the statement as required by Sections 1.1308 and 1.1311 of the Commission's rules, 47 C.F.R. §§ 1.1308 and 1.1311, as an exhibit to this application. A Radiation Hazard Study must accompany all applications for new transmitting facilities, major modifications, or major amendments. (○) Yes (●) No

ALIEN OWNERSHIP

Earth station applicants not proposing to provide broadcast, common carrier, aeronautical en route or aeronautical fixed radio station services are not required to respond to Items 30−34.

29. Is the applicant a foreign government or the representative of any foreign government?	○ Yes ◉ No
30. Is the applicant an alien or the representative of an alien?	○ Yes ○ No ◉ N/A
31. Is the applicant a corporation organized under the laws of any foreign government?	○ Yes ○ No ◉ N/A
32. Is the applicant a corporation of which more than one−fifth of the capital stock is owned of record or voted by aliens or their representatives or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?	○ Yes ○ No ◉ N/A
33. Is the applicant a corporation directly or indirectly controlled by any other corporation of which more than one−fourth of the capital stock is owned of record or voted by aliens, their representatives, or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?	○ Yes ○ No ◉ N/A
34. If any answer to questions 29, 30, 31, 32 and/or 33 is Yes, attach as an exhibit an identification of the aliens or foreign entities, their nationality, their relationship to the applicant, and the percentage of stock they own or vote.	Exhibit B

35. Does the Applicant request any waivers or exemptions from any of the Commission's Rules? If Yes, attach as an exhibit, copies of the requests for waivers or exceptions with supporting documents.	(●) Yes ( ) No
36. Has the applicant or any party to this application or amendment had any FCC station authorization or license revoked or had any application for an initial, modification or renewal of FCC station authorization, license, or construction permit denied by the Commission? If Yes, attach as an exhibit, an explination of circumstances.	( ) Yes (●) No
37. Has the applicant, or any party to this application or amendment, or any party directly or indirectly controlling the applicant ever been convicted of a felony by any state or federal court? If Yes, attach as an exhibit, an explination of circumstances.	( ) Yes (●) No
38. Has any court finally adjudged the applicant, or any person directly or indirectly controlling the applicant, guilty of unlawfully monopolizing or attemptiing unlawfully to monopolize radio communication, directly or indirectly, through control of manufacture or sale of radio apparatus, exclusive traffic arrangement or any other means or unfair methods of competition? If Yes, attach as an exhibit, an explanation of circumstances	( ) Yes (●) No
39. Is the applicant, or any person directly or indirectly controlling the applicant, currently a party in any pending matter referred to in the preceding two items? If yes, attach as an exhinit, an explanation of the circumstances.	( ) Yes (●) No

40. If the applicant is a corporation and is applying for a space station license, attach as an exhibit the names, address, and citizenship of those stockholders owning a record and/or voting 10 percent or more of the Filer's voting stock and the percentages so held. In the case of fiduciary control, indicate the beneficiary(ies) or class of beneficiaries. Also list the names and addresses of the officers and directors of the Filer.	Exhibit C
41. By checking Yes, the undersigned certifies, that neither applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti−Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. See 47 CFR 1.2002(b) for the meaning of "party to the application" for these purposes.	◉ Yes ○ No
42a. Does the applicant intend to use a non−U.S. licensed satellite to provide service in the United States? If Yes, answer 42b and attach an exhibit providing the information specified in 47 C.F.R. 25.137, as appropriate. If No, proceed to question 43.	◉ Yes ○ No
42b. What administration has licensed or is in the process of licensing the space station? If no license will be issued, what administration has coordinated or is in the process of coordinating the space station? United Kingdom	

43. Description. (Summarize the nature of the application and the services to be provided). (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

```
Inmarsat Global Limited submits a petition for declaratory ruling to provide MSS using a
spacecraft at 113 W.L. operating at 2 GHz and the extended Ku bands.  Operations in those
bands are not eligible for inclusion on the permitted space station list, but Item 17 does
not provide an option for petitions for declaratory ruling other than to be included on
```

CERTIFICATION

The Applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and requests an authorization in accordance with this application. The applicant certifies that grant of this application would not cause the applicant to be in violation of the spectrum aggregation limit in 47 CFR Part 20. All statements made in exhibits are a material part hereof and are incorporated herein as if set out in full in this application. The undersigned, individually and for the applicant, hereby certifies that all statements made in this application and in all attached exhibits are true, complete and correct to the best of his or her knowledge and belief, and are made in good faith.

44. Applicant is a (an): (Choose the button next to applicable response.)

- ○ Individual
- ○ Unincorporated Association
- ○ Partnership
- ● Corporation
- ○ Governmental Entity
- ○ Other (please specify)

45. Name of Person Signing	46. Title of Person Signing
Alison Horrocks	Company Secretary

47. Please supply any need attachments.		
1: Exhibit A	2:	3:

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND / OR IMPRISONMENT (U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION AUTHORIZATION (U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).

Completed Schedule S

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43. Description. (Summarize the nature of the application and the services to be provided).

Inmarsat Global Limited submits a petition for declaratory ruling to provide MSS using a spacecraft at 113 W.L. operating at 2 GHz and the extended Ku bands. Operations in those bands are not eligible for inclusion on the permitted space station list, but Item 17 does not provide an option for petitions for declaratory ruling other than to be included on the permitted space station list and the electronic form does not provide Item 17.b13 ('Other') as an option.

Exhibit A
Response to Item 24
Frequency Bands

MSS service links will operate in portions of the 2000-2020 MHz (uplink) and 2180-2200 MHz (downlink) bands. Feeder link and tracking, telemetry and command (“TT&C”) functions will be conducted in the 13.8-14.0 GHz and 11.5-11.7 GHz bands.

Exhibit B
Response to Item 34
Description of Foreign Ownership

Section 310(b) of the Communications Act does not apply to authorizations for services authorized on a non-common carrier basis, such as those proposed here. *See Application of LMGT Astro Licensee, LLC, Assignor and Astrolink International, LLC, Assignee; for Authority to Assign Authorization to Launch and Operate a System of Ka-Band Fixed Satellites*, 15 FCC Rcd 21777 (1999).

Exhibit C
Response to Item 40
Description of Ownership; Officers and Directors

Please see Section II.I of Exhibit E to this Form 312, the Application Narrative, for the names, address, and citizenship of those stockholders owning and/or voting 10 percent or more of the Inmarsat Global Limited's voting stock and the percentages held, and a list the names and addresses of the officers and directors of the Inmarsat Global Limited.

Exhibit D
Response to Item 42a
Information Required by Section 25.137 of the Commission's Rules

Please see Exhibit E to this Form 312, the Application Narrative, including Section II.I (which cross-references additional portions of this Application).

EXHIBIT E

NARRATIVE

In the Matter of	)	
	)	
Inmarsat Global Limited	)	
	)	File No. __________________
Petition for Declaratory Ruling to Provide	)	
Mobile Satellite Service to the United States	)	
Using the 2 GHz and Extended Ku Bands	)	

Inmarsat Global Limited

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44-20-7728-1000

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Counsel for Inmarsat Global Limited

September 26, 2005

TABLE OF CONTENTS

In the Matter of	)	
	)	
Inmarsat Global Limited	)	
	)	File No. _________________
Petition for Declaratory Ruling to Provide Mobile Satellite Service to the United States Using the 2 GHz and Extended Ku Bands	)))	

Inmarsat Global Limited ("Inmarsat") respectfully petitions the Commission, pursuant Section 25.114 of the Commission's rules, *DISCO II*[1] and its progeny, and the market-access procedures established in the *Space Station Licensing Reform Order*,[2] for Commission authorization to provide mobile satellite service ("MSS") to the U.S. using a spacecraft at 113º W.L. that will operate in the 2 GHz band and the extended Ku band.

Inmarsat seeks U.S. market access using a spacecraft authorized by the United Kingdom. MSS service links will operate in portions of the 2000-2020 MHz (uplink) and 2180-2200 MHz (downlink) bands. Feeder link and tracking, telemetry and command ("TT&C") functions will be conducted in the 13.8-14.0 GHz and 11.5-11.7 GHz bands. This proposed spacecraft is an integral part of Inmarsat's planned next-generation global system, which requires access to 2 GHz spectrum to meet the anticipated demand for new multimedia and emerging broadband services.

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1 *Amendment of the Commission's Regulatory Policies to Allow Non-U.S. Licensed Satellites Providing Domestic and International Service in the United States*, 12 FCC Rcd 24094 (1997) ("*DISCO II*"), *on reconsideration,* 15 FCC Rcd 7207 (1999) ("*DISCO II First Reconsideration Order*").

2 *Amendment of the Commission's Space Station Licensing Rules and Policies, Mitigation of Orbital Debris*, 18 FCC Rcd 10760 (2003) ("*Space Station Licensing Reform Order*").

I. GRANT OF INMARSAT'S MARKET ACCESS REQUEST WILL SERVE THE PUBLIC INTEREST

Pursuant to *DISCO II* and its progeny, and the recent *Space Station Licensing Reform Order*, the Commission follows a multi-prong public interest test in evaluating requests to use non-U.S.-licensed space stations to provide satellite service in the United States.[3] That analysis considers the effect of granting the request on competition in the United States (including trade and foreign policy concerns), spectrum availability, and national security, law enforcement, and public safety considerations, as well as conformance with the Commission's technical informational requirements.[4] As set forth below, Inmarsat fully satisfies the Commission's market access criteria.

A. Background on Inmarsat

Inmarsat is well-qualified to deploy a 2 GHz MSS satellite, as part of its next-generation system, to serve the United States. Inmarsat has more than two decades of experience implementing and operating a global fleet of MSS satellites that provide essential services to, from, and within the United States (and worldwide) to public safety, military, governmental, commercial, and humanitarian users alike.

Inmarsat has a long history of building, launching, and operating advanced MSS spacecraft to meet the needs of its users. Inmarsat started operations in 1982, using capacity on the satellites of others. In the early 1990s, Inmarsat launched four of its own satellites, at a cost of approximately $675 million, to support communications and safety-related MSS services in virtually every corner of the globe. These four Inmarsat-2 L-Band satellites are still in geostationary orbit at 179° E.L., 98° W.L., 142° W.L. and 109° E.L, and are successfully operating well beyond their initial design lives. In response to the rapid growth in demand for its

3 *Id.*

4 *See generally Disco II* at ¶¶ 30-182.

services, in the last half of the 1990s, Inmarsat launched a follow-on generation of satellites, Inmarsat-3s, at a cost of approximately $895 million. The L-Band Inmarsat-3 satellites are currently located at 64° E.L., 15.5° W.L., 178° E.L., 54° W.L. and 25° E.L., and also provide worldwide coverage.

Inmarsat's efforts to promote the growth and development of the MSS industry are further evidenced by its recent investment of over $1.5 billion in the deployment of its next-generation Inmarsat-4 network of L-Band satellites and related ground infrastructure, and the launch of its innovative Broadband Global Area Network ("BGAN") service over that system. Those Inmarsat-4 satellites are specifically designed to support high bandwidth (up to half a megabit per second) data services, and will supplement the capabilities of the existing fleet. The first Inmarsat-4 satellite commenced commercial service on May 28, 2005 at 64° E.L., and the second is at the launch site and is scheduled for launch in November 2005, and is expected to begin serving the U.S. shortly thereafter at 53° W.L.[5] A third Inmarsat-4 spacecraft, currently designated a ground spare, is fully constructed and is scheduled to be available for launch in 2006, when it could be placed into a number of orbital locations to serve the U.S.

Inmarsat is committed to remaining at the leading edge of technological and commercial innovation and enterprise. Now that Inmarsat is nearing completion of the deployment of its $1.5 billion next-generation Inmarsat-4 satellite network, Inmarsat is working aggressively on its plans for a state-of-the-art, next-generation MSS system, optimized for tomorrow's wireless broadband and multimedia needs, using the 2 GHz band, and focused on providing a platform for the next generation of global voice, data, and multimedia MSS offerings.

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[5] As with other Inmarsat spacecraft, this spacecraft will be slightly offset from its nominal orbital location.

B. Services to be Supported

Inmarsat's 2 GHz MSS system, described in further detail herein, will provide new types of broadband and multimedia services across a hybrid satellite/terrestrial architecture developed in potential partnership with leading technology, service, and content partners, as well as provide expansion capacity for existing Inmarsat services.[6] This 2 GHz system therefore will enhance Inmarsat's role as a provider of reliable safety-related services, and mission-critical government and business communications services, by expanding the capabilities of the current Inmarsat system, both domestically and internationally, on which U.S. government agencies (including the U.S. military, the Federal Emergency Management Agency ("FEMA"), the State Department, the Department of Homeland Security, the Federal Bureau of Investigation, the Drug Enforcement Administration, the National Guard, the U.S. Coast Guard, and U.S. state and local governments and law enforcement) as well as similar government agencies around the world, independently and in coordination with each other, have increasingly relied. As set forth in greater detail below, access to the 2 GHz band will allow Inmarsat to continue its legacy support for the needs of the U.S. military, civil defense and homeland security providers by launching increasingly sophisticated and efficient spacecraft that are available in times of crisis or disaster to: (i) restore communications once a terrestrial communications network is destroyed; and (ii) facilitate the prompt establishment of communications networks for first responders, civil defense providers, and law enforcement.[7]

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6 The ATC component of this system will be the subject of a further application at a future date.

7 *Gulf Region Satellite Demand Still High*, COMMUNICATIONS DAILY, Sept. 9, 2005, at 4-5 (describing use of existing Inmarsat system to restore communications in area devastated by Hurricane Katrina).

In order to fully appreciate the advanced benefits that Inmarsat's 2 GHz system can provide for those purposes, it is important to first review the ways in which users rely on Inmarsat today, as well as the limitations that use of the L-Band imposes on the growth of existing MSS services, and the development of new MSS services.

1. Current Inmarsat Services

Inmarsat currently offers a wide range of services to users with mobile communications needs or who are beyond the reach of terrestrial communications networks, whether those users are on land, at sea, or in the air, and wherever those users are located around the world. Governments, companies and individuals currently use the Inmarsat system for diverse communications purposes, including aeronautical and maritime navigation, distress messaging, search and rescue operation coordination, remote reporting, streaming video, Internet access and voice communications. The U.S. military and Coast Guard, FEMA, the President of the United States, The New York City Fire Department, CNN, NPR, the Red Cross, and nearly every major airline and shipping line are examples of the users who rely on Inmarsat for their critical communications needs. Where no other communication service will reach, where weather or disasters preclude use of terrestrial networks, and where highly secure communications are needed, Inmarsat's MSS system provides a vital, instantaneously-available, and reliable link for private and governmental users alike.

(i) Maritime Services

Inmarsat serves the data and voice communications needs of a variety of users at sea, including the United States Navy, the United States Coast Guard, merchant vessels, passenger ships, fishing fleets and oil drilling platforms. Individuals on ships and oil platforms are able to make voice calls, access the Internet and receive vital information from shore, including weather reports and emergency bulletins. Inmarsat services support ship management applications that are critical to the safe operation of the vessels and to continuing environmental protection, and are used in conjunction with GPS to provide highly accurate position reporting.

(ii) Land Based Services

Inmarsat high-speed data and voice services meet the needs of land-based users around the world, including media organizations, aid organizations, construction companies and energy and mining interests. Anyone located virtually anywhere with a clear view of the southern sky, whether in urban, suburban, or rural areas, is assured of reliable communications services through the Inmarsat network. Companies such as CNN, NPR, the BBC, and Reuters use Inmarsat services to stream live broadcast-quality voice and store-and-forward video footage, facilitating real-time news reporting from remote locations. Corporations and governments use Inmarsat services for video conferencing, monitoring of vehicle fleets, precision location, and remote operation of facilities.

Moreover, aid organizations such as UNICEF, the Red Cross, and Médecins Sans Frontières (Doctors Without Borders) use Inmarsat services for voice and data communications from various locations around the globe. Inmarsat also supports Télécoms Sans Frontières (Telecom Without Borders), which sends volunteers with Inmarsat terminals into disaster areas (such as the current natural disaster sites in Louisiana, Mississippi, Alabama, and Texas) to enable victims and rescue and aid workers to communicate in the absence of a terrestrial communications network.

In fact, in response to the recent national disasters in the Gulf of Mexico, Inmarsat and its distribution partners have provided MSS terminals and free air time to the U.S. Marines, FEMA, the State Police, the National Guard and Members of Congress, among others. These services have facilitated both the coordination of relief efforts, and the provision of "life line" communications for U.S. citizens displaced by the disasters.

Inmarsat's land-based service provides a means of communication that is largely immune to natural and man-made disasters. When landlines and terrestrial wireless service are disrupted by natural disaster, terrorism, or civil disturbances, Inmarsat services provide governments, aid organizations and commercial and residential users with the means to send and receive vital information necessary to address the situation. Thus, Inmarsat provides critical communications that otherwise are unavailable when terrestrial networks fail.

(iii) Aeronautical Services

Inmarsat serves commercial, private business and government airplanes, including those of the United States government (including a fleet of aircraft that transport the President of the United States, the Vice President, members of the President's Cabinet, senior members of government agencies, and Congressional delegations), almost all major airlines and various multinational corporations. These aeronautical services are used for a variety of purposes including air traffic control, automatic reporting of aircraft positions, revising flight plans, transmitting weather and ground conditions, and providing passengers with voice, fax, and data communications, and live news and video feeds.

(iv) Safety Services

The beginning of the Global Maritime Distress and Safety System ("GMDSS") in February 1992 marked the transition from a terrestrially based system for ships in distress at sea to one based mainly on satellite communications. Under the old system, ships primarily sought help from other ships who may happen to be in the area. Under GMDSS, maritime vessels are now able to use a satellite link to contact shore-based search and rescue authorities, regardless whether other ships happen to be nearby. In addition, satellite communications coupled with GPS technology allow a vessel to broadcast its precise location to Coast Guard ships and nearby vessels, thereby speeding rescue efforts.

Inmarsat offers satellite communications services that cover almost the entire globe and provide the necessary bandwidth for priority instant distress and safety communications. Certain Inmarsat service offerings are recognized by the International Maritime Organization ("IMO") as being qualified to be used as part of the GMDSS.[8] The SOLAS Convention of 1974, to which the United States is a signatory, requires all cargo ships of 300 tons gross or more, and all passenger ship traversing international waters, to maintain an Inmarsat terminal on board, to ensure the safety of passengers and crew.

In the case of a distress call, coast guard services, including the U.S. Coast Guard, can be dispatched on rescue missions. The rescue ships are then able to keep in contact with both the distressed vessel and their base stations throughout the mission using the Inmarsat system. Inmarsat provides maritime vessels around the world with the knowledge and advance warnings necessary to avoid disaster and a means of reliably summoning assistance when needed.

With respect to aeronautical safety, Inmarsat is currently the only satellite communications provider to have met the International Civil Aviation Organization ("ICAO") standards for the provision of aeronautical safety services, such as air traffic management and air traffic operational control.[9] All the major U.S. airlines use Inmarsat services on transoceanic flights, and the Federal Aviation Administration has been using Inmarsat to communicate with flights on certain routes since 1996. In 2001, aircraft position reporting via Inmarsat was introduced in North Atlantic airspace, which allows air traffic controllers in Canada, Iceland and the United Kingdom to set up contacts with aircraft via datalink to report their position and

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[8] Any satellite system is able to provide satellite communications services for GMDSS if it complies with the stringent IMO standards, but Inmarsat is the only satellite system that is currently so qualified.

[9] ICAO will certify other MSS providers as compliant, but no other provider has yet met its standards.

receive weather information. In the event of a distress situation, or where other forms of communication fail, the Inmarsat system can be used to direct planes to safety and send assistance when needed.

2. Inmarsat's Services Are Growing Significantly

Inmarsat's growing spectrum needs, and its plans to deploy a 2 GHz MSS system, are driven by the consistent and significant growth in Inmarsat traffic, and the need to support the increasing demand for higher data transmission speeds, as well as new multimedia and emerging broadband services.

MSS service applications and bandwidth demands, and Inmarsat's use of its existing L-Band spectrum in particular, continue to grow at a significant rate and are expected to accelerate in the coming years. Longstanding maritime applications are becoming more data intensive and more highly used as fleet operators extend corporate networks to their vessels around the world, as increasing bandwidth drives innovation in commercial applications, and as users realize the value provided by these services. Aeronautical MSS uses are dramatically expanding in both the cabin and the cockpit, as MSS provides the opportunity for an "always on" broadband link to airplanes, wherever they are flying, to support air traffic control, weather updates, navigation, and voice and data communications. Moreover, the use of MSS to support land mobile services will continue to grow, particularly with the forthcoming deployment in the U.S. and elsewhere of Inmarsat's innovative BGAN service, which is expected to drive the demand for, and innovation in, data-intensive applications and to extend the range of potential customers for MSS.

Inmarsat's projections for future demand are buttressed by its real world experience. Over the last six years, Inmarsat's revenues from its spectrum-intensive high-speed data and capacity leasing services have grown at a compound annual rate of more than 15 percent, amply demonstrating the global thirst for ubiquitous, high-quality, reliable, high-speed data services. Inmarsat believes that this growth will accelerate in the coming years based on a number of factors, including (i) the imminent launch of its next-generation BGAN land mobile services, which support rich, new high-speed-data services at up to three times the current maximum speed for MSS services, to terminals a third of the price, weight and size of current generation high-speed MSS terminals, (ii) the subsequent launch by Inmarsat of complementary maritime BGAN (Fleet Broadband) and aeronautical BGAN (Swift Broadband) services that are expected to follow, and (iii) a wide range of value-added applications and services made possible by these and other technical advances in communications, computing and related technologies.

Despite the exponential increase in efficiency with which the revolutionary Inmarsat-4 system uses the scarce L-Band spectrum resource, and even taking into account similar expected gains in spectrum efficiency in the future, the high-bandwidth demands of MSS broadband and multimedia services, and the rapid take-up of new MSS services and applications, eventually can be expected to outstrip the available capacity in the L-Band. Inmarsat's access to the 2 GHz band therefore is of vital importance because it *both* (i) provides for the continued growth of existing MSS services, and (ii) allows the development of new and innovative MSS services that cannot easily be accommodated in other MSS bands (such as the L-Band) because of existing uses of those bands by satellite networks around the world, and the ways that shared use of those bands is accommodated.

3. 2 GHz Supports Services That Realistically Cannot Be Provided at L-Band

The 2 GHz band is unique among MSS bands. It is ideal for supporting the growing demand for multimedia and broadband services to mobile, vehicular, and portable devices, including personalized access to news, music and video entertainment, and information services. By combining the unrivalled ubiquitous reach of satellite technology with the "greenfield" that is 2 GHz, an MSS system in the 2 GHz band can allow new multicast, streaming, and video-on-demand applications to be delivered seamlessly to low-cost terminal equipment, and with the efficiencies inherent in "piggybacking" on technological developments that are being made to support terrestrial 3G networks. MSS is the sole technology that can offer a nationwide, highly-reliable, "anytime, anywhere" mobile broadband and multimedia network with the launch of a single radio transmitter. Moreover, 2 GHz MSS is exceptionally well-suited to providing a "megacell" overlay to the terrestrial wireless network in support of such applications, because the traditional 3G network architecture, with hundreds of base-stations, is not an efficient platform for transmitting multicast content.

There are a number of reasons why the 2 GHz band is uniquely suited to support new broadband and multimedia MSS offerings, and why it is well-suited to support the provision of such offerings over small, personal communications devices to the entire community of government (including civil defense and homeland security), enterprise, and consumer users.

(i) Synergies with Terrestrial 3G

The fact that the 2 GHz bands allocated for the terrestrial wireless and satellite components of IMT-2000 are physically near each other facilitates the development and implementation of user terminals with 3G form factors and sizes, as well as service capabilities, comparable to those offered by 3G terrestrial systems. These two factors, in turn, enable the mass-market development of integrated and interoperable satellite/terrestrial terminals that (i) can provide ubiquitous coverage and mobile services throughout North America, and (ii) can be produced at much lower costs than are otherwise possible. Thus, 2 GHz should, for example, allow reliable, inexpensive and secure personal dual mode satellite/terrestrial communications devices to be made available to all emergency personnel throughout the U.S. The 2 GHz MSS band is ideally suited to support the development of advanced and innovative broadband and multi-media services for mobile users.

(ii) Support for Wide-Bandwidth Channels

The 2 GHz band is essentially “virgin” spectrum from an MSS standpoint and affords considerable flexibility for the development of new and innovative MSS services. The 2 GHz band supports the employment of channels wider in bandwidth than those that are used for MSS today, which would be well-suited to provide emerging broadband and multimedia MSS offerings. In contrast, various MSS operators around the world historically have used the L-Band spectrum for a mix of voice and relatively low-data-rate traffic, which (i) has led to a high level of segmentation or fractionalization of the band (*e.g.*, segments as small as 50 kHz) region-by-region, and (ii) has resulted in limited opportunity to re-assemble the L-Band into the types of spectrum building blocks more suitable for the provision of emerging broadband and multimedia MSS offerings, particularly across more than one geographic region. This problem in the L-Band is exacerbated because the ability to rechannelize the band in Region 2 (which includes the United States) is constrained by the impact of any changes on L-Band MSS operators in Regions 1 and 3, five of whom have no interest in Region 2.

Moreover, the L-Band is needed to support the hundreds of thousands of existing users of MSS currently being provided in the L-Band who have, in the aggregate, invested billions of dollars in their terminal equipment and related communications infrastructure. There are significant technical challenges involved with offering a high data rate platform to emerging multimedia services in the L-Band alongside currently provided services in the L-Band that have very different channelization requirements. The 2 GHz band is not subject to these types of constraints.

(iii) Lack of Congestion and Preemption Priority

There are simply no MSS systems operating today in the 2 GHz band. In contrast, the L-Band MSS spectrum at 1525-1559/1626.5-1660.5 MHz is heavily congested in ITU Region 2 (the Americas) and in the rest of the world as well, with (i) five different operators having rights to the L-Band in Region 2, (ii) seven different operators having rights to the L-Band in Regions 1 and 3, and (iii) over 20 GSO spacecraft currently in operation around the world with L-Band payloads. The existing congestion in L-Band MSS spectrum is likely to be exacerbated through continued growth in the services being offered by successful MSS providers, like Inmarsat, and the fact that the annual spectrum assignment process for Region 2 has essentially been inoperable since 1999, preventing the reallocation of under-utilized spectrum to those operators, like Inmarsat, whose MSS needs are growing rapidly and who are beginning to encounter spectrum constraints. Finally, as noted above, the L-Band is used for "safety related" GMDSS and AMS(R)S services, which are afforded regulatory priority under ITU and Commission rules. For Inmarsat, the requirement to give priority or preference in assigning channels to safety services has had a clear and significant impact on its operational flexibility. The 2 GHz band is not subject to any such preemption priorities.

4. 2 GHz Services and Benefits

As detailed above, the 2 GHz band is unique in its ability to facilitate the deployment of multimedia and emerging broadband services provided to small, personal terminals, such as handheld, palm, pocket, and notebook-sized devices. To meet the demands for mobile service to such devices, Inmarsat intends to initiate the rapid development and deployment of a new 2 GHz, U.S.-focused, regional satellite platform to deliver a rich variety of services to users through small, personal terminals – an aspect of MSS that Inmarsat has not previously targeted, and other mobile, portable and vehicular antennas as well.[10] This initiative will pave the way for Inmarsat to serve a much wider customer base with far lower barriers to entry, seamlessly complementing and extending terrestrial mobile networks and using Inmarsat's unrivalled experience, in the field, integrating terrestrial wireless 3G and satellite technologies.

Key elements to supporting these needs include the use of open air interfaces and the development of commercial relationships with other network technologies, for example, to enable a user to first receive service from a personal/corporate picocell in a home/office environment, then seamlessly hand off to a metropolitan cellular network in an urban environment, and then transition to satellite coverage as the user moves between cities - at all times remaining connected to the network that is most cost effective for delivering the service.

The Inmarsat 2 GHz MSS system does not inherently constrain the choice of air interface technology used in the user terminal. In fact, the system supports multiple air interface technologies because the system provides for the dynamic aggregation of multiple adjacent 250 kHz sub-bands into larger channels. The table below illustrates the characteristics of the most common mobile air interfaces used in typical terrestrial and satellite mobile systems, all of which will be supportable on this system.

Mobile Air Interface Technology	Channel Bandwidth	Modulation	Multiple Access	Satellite Enabled
GSM	200 kHz	GMSK	TDMA	Satellite Variant Available
WCDMA	5 MHz	QPSK	CDMA	Satellite Variant Available
CDMA-2000 1x EVDO	1.25 MHz	BPSK to 16 QAM	CDMA, TDM	With Adaptations
WiMAX	3.5-10 MHz	Multicarrier QPSK to 64 QAM	OFDMA	With Adaptations
GMR-1	200 kHz	QPSK	TDMA	Native Satellite Air Interface
IAI-2	200 kHz	QPSK, 16 QAM	TDMA	Native Satellite Air Interface

10 Ultimately, Inmarsat intends to implement these types of services on a global scale. However, recognizing the unique attributes and maturity of the U.S. market, as well as the enhancement afforded by the Commission's ATC rulemaking, Inmarsat plans to address the U.S. market first, in advance of implementing other 2 GHz regional satellites in other regions of the world.

As detailed further in Appendix A, the Inmarsat 2 GHz system will support a wide range of services and provide a variety of public interest benefits, including the following:

- multimedia streaming audio and video delivered directly to small terminals that offer value-added interactivity, store-and-replay and on-demand features;

- monitoring and other security applications, including, remote instrumentation, distress beacons, environmental and safety monitoring, asset tracking, inventory and compliance monitoring, vessel and container tracking for port and airport security, theft tracking, emergency and accident reporting, and remote diagnostics;

- cost effective high-quality satellite voice telephony service;

- satellite VoIP that is competitive with terrestrial systems in both quality and bandwidth utilization;

- contention-based variable bit rate IP data services supporting delivery of low cost-per-bit and high peak bit rates;

- affordable multimedia and broadband mobile communications for users in remote and rural areas who historically have been underserved;

- location based services including telematics, toll charging, mapping and navigation, locally targeted advertising and information services, news, travel reports, geographically targeted emergency assistance, automatic emergency services notification, agricultural and fisheries data, remote automotive diagnostics and law enforcement;

- communications services that can be deployed on an ad hoc or flash basis, and therefore quickly deployed by public safety, defense and health personnel in the event of civil emergency;

- equipment interoperable with, and therefore able to augment, emergency response equipment already deployed in the field; and

- inexpensive and secure handheld, personal satellite communications devices that can be made available to all emergency personnel, local, state and federal alike.

The range of data-rates and traffic characteristics this 2 GHz MSS system will support are illustrated in the following table:

Application	Antenna Class[11]	Bit Rate Variation	Typical Data Rate
Voice Telephony	handheld, palm, pocket, notebook	Constant	4 kbps
Push to Talk	handheld, palm, pocket, notebook	Variable	4 kbps
Data (e-mail, HTML)	handheld, palm, pocket, notebook	Variable	50 kbps – 2 MBps+
Videoconferencing	handheld, palm, pocket, notebook	Constant	64 kbps (handheld screen) to 700 kbps (television quality)
Streaming Audio	handheld, palm, pocket, notebook	Constant	20 - 40 kbps per channel
Streaming Video	handheld, palm, pocket, notebook	Constant	64 kbps (handheld screen) to 700 kbps (television quality)
SCADA	handheld	Variable	500 bps to 50 kbps

As detailed above and in Appendix A, the 2 GHz band provides the opportunity to support a range of new multimedia and emerging broadband services. These services, once made available, will certainly lead to new service applications that cannot be foreseen today. Just as civil defense and homeland security providers increasingly have begun to rely on the broadband offerings recently made available by satellite, it is certain these entities will stand to benefit greatly from the multimedia and emerging broadband services that can be deployed at 2 GHz.

Inmarsat, whose role in providing safety related services has evolved from the limited maritime safety services first offered over the Marisat system to the broad range of aeronautical, land mobile and maritime services being provided today, stands ready to ensure that all Americans – homeland security providers, first responders, military, government, business and consumers alike – have access to competitively-provided 2 GHz MSS offerings. MSS brings to the United States significant benefits in terms of the roll out of those next-generation services, ensuring that, through the unique characteristics inherent in the MSS business model, broadband services can be made available seamlessly across the whole U.S. In doing so, MSS avoids the bifurcated communications landscape of “haves” and “have-nots” historically seen with the roll-out of cutting-edge terrestrial communications services. MSS

[11] Also includes similarly-sized vehicular antennas.

therefore supports the Commission's goals of an accelerated roll out of broadband services across America.

C. Effect on Competition

An express policy goal of the ORBIT Act was to promote competition in the provision of satellite communications through the privatization of former intergovernmental organizations, including Inmarsat. In the 2001 *Inmarsat Market Access Order*, the Commission concluded that its "finding that Inmarsat has privatized consistent with the provisions of the ORBIT Act is largely dispositive of the traditional DISCO II competition analysis . . . ."[12] The Commission recently confirmed that Inmarsat has met the remaining privatization requirements of the ORBIT Act,[13] and, in so doing, determined that "Section 602, which prohibits Inmarsat from providing additional services and requires the United States to decline and oppose new orbital locations for provision of such services until Inmarsat meets the privatization requirements of the ORBIT Act, is no longer applicable."[14] Thus, the Commission determined that the ORBIT Act prohibition on Inmarsat's use of the 2 GHz band no longer bars consideration of this type of request,[15] and reinforced the prior Commission conclusion that allowing Inmarsat to serve the U.S. will promote competition.[16]

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[12] *Comsat Corporation d/b/a Comsat Mobile Communications, et al.* 16 FCC Rcd 21661, ¶ 62 (2001) ("*Inmarsat Market Access Order*").

[13] *See Inmarsat Group Holdings Limited, Petition for Declaratory Ruling Pursuant to Section 621(5)(F) of the ORBIT Act*, FCC 05-126 at ¶ 26 (rel. June 14, 2005) ("*2005 Inmarsat ORBIT Act Order*").

[14] *Id*. Inmarsat's 1997 2 GHz market access request was submitted before, and withdrawn after, this ORBIT Act prohibition on providing "additional services" prior to an IPO was enacted.

[15] *Id.*

[16] *See 2005 Inmarsat ORBIT Act Order* at ¶ 62.

Moreover, this request fully satisfies traditional *DISCO II* criteria. The Inmarsat 2 GHz satellite will be located at 113° W.L. pursuant to authority of the United Kingdom. The United Kingdom is a member of the WTO, and the MSS services that Inmarsat intends to provide to the U.S. are covered by the WTO Basic Telecommunications Agreement. Accordingly, the Commission applies a presumption in favor of market access in this case, and no effective competitive opportunities demonstration is required.[17]

Providing the Inmarsat 2 GHz satellite with market access from 113° W.L. will help to fulfill the promise of the WTO Basic Telecommunications Agreement with respect to satellite communications services. Further, it will enhance competition in the U.S. by providing the opportunity for more than two MSS providers at 2 GHz, thereby improving service quality, increasing service options, lowering prices, and fostering technological innovation.[18] The Commission has consistently relied on these same public interest benefits in granting similar U.S. market access requests.[19]

D. Spectrum Availability

Inmarsat seeks authority to serve the United States from the 113° W.L. location, with MSS service links in portions of the 2000-2020 MHz and 2180-2200 MHz segments of the 2

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[17] *See* 47 C.F.R. § 25.137(a)(2); *see also DISCO II Order*, ¶ 39 ("We adopt our proposal to apply a presumption in favor of entry in considering applications to access non-U.S. satellites licensed by WTO Members to provide services covered by the U.S. commitments under the WTO Basic Telecom Agreement"), ¶ 64 ("[W]e will not evaluate the effective competitive opportunities in the route market for non-U.S. satellites licensed by a WTO Member providing WTO-covered services. Thus, we will not perform an ECO-Sat test on any route, whether a WTO route market or a non-WTO route market.").

[18] *Space Station Licensing Reform Order* at ¶¶ 61-64 (describing Commission policy to facilitate at least three initial competitors in a frequency band).

[19] *See, e.g., Digital Broadband Applications Corp.*, 18 FCC Rcd 9455 (2003); *Pegasus Development Corp.*, 19 FCC Rcd 6080 (2004); *In the Matter of DIRECTV Enterprises, LLC, Request for Special Temporary Authority for the DIRECTV 5 Satellite*, DA 04-2526, (rel. Aug. 13, 2004).

GHz band, and with FSS feeder links in the 13.8-14.0 GHz and 11.5-11.7 GHz portions of the extended Ku Band.

As noted above, this spacecraft is authorized by the Office of Communications in the United Kingdom ("Ofcom"). As the Commission is aware, the U.K. process is different than the Commission's, in that a formal license to launch a satellite typically does not issue until close to the launch of a U.K.-sponsored spacecraft. In many other respects, the Ofcom process is similar to the Commission's. Namely, an entity seeking a U.K. satellite network authorization must demonstrate that it has the required technical, financial and legal credentials to construct, launch and operate the proposed satellite network before Ofcom will submit the requisite materials to the ITU. Furthermore, Ofcom requires that an entity make satisfactory implementation progress against due diligence milestones.[20]

Inmarsat's technical, financial and legal credentials have been well-established to Ofcom---the U.K. is the authorizing administration for the existing Inmarsat fleet, including the new Inmarsat-4 spacecraft. Thus, on May 19, 2005, Ofcom submitted Advance Publication filings to the ITU on Inmarsat's behalf with respect to the operation of a 2 GHz MSS network at a number of orbital locations, including a submission for which a Coordination Request to the ITU with respect to 113° W.L. will be forwarded within the next few weeks.[21] Thus, Inmarsat is similarly situated to another entity authorized by the U.K. who recently sought and received U.S. market access with respect to an unlaunched spacecraft for which Ofcom had submitted ITU Advance Publication materials.[22]

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[20] Ofcom, Procedure for Authorisation of Satellite Networks (Mar. 24, 2005), at §§ 1.3, 3.5, 3.7.

[21] *See* Appendix C. The 113° W.L. location is within the range for which coordination may be sought based on the Advance Publication materials attached as Appendix C.

[22] *ICO Satellite Services G.P., Application for Modification of 2 GHz LOI Authorization, Petition for Declaratory Ruling or Waiver*, 20 FCC Rcd 9797, ¶ 33 (2005) ("*ICO*") (finding

This request is fully consistent with the procedures set forth by the Commission in the *Space Station Licensing Reform Order* regarding U.S. market access. No entity is authorized by the Commission to use the extended Ku band spectrum at the 113° W.L. orbital location. No U.S. licensee is authorized to provide MSS at 2 GHz. Two non-U.S.-licensed entities have been granted U.S. market access at 2 GHz, ICO (U.K.-licensed) and TMI (Canadian-licensed), but neither ICO nor TMI is close to launching or operating a spacecraft to provide 2 GHz MSS. Both the *Space Station Licensing Reform Order* and prior precedent are clear that the existence of those market access authorizations is not a barrier to consideration or grant of this request to provide MSS in the 2 GHz band.

As the Commission is aware, the ICO and TMI market access authorizations were initially granted as part of the first 2 GHz processing round. Commission precedent is clear that the grant of authority in a processing round does not preclude subsequent consideration of market access requests in the same frequency band. In 1997, the Commission initiated the second Ka band processing round, KaStarCom participated in that process, and ultimately was awarded authority to launch and operate a Ka band spacecraft at 111º W.L.[23] Over four years after the close of that processing round, and without participating in it, Telesat Canada sought access to the U.S. market using Ka-band capacity on a yet-to-be launched Canadian spacecraft

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submission of ITU API materials satisfied condition precedent to considering market access request under 25.137(b)). Precedent further demonstrates that the Commission will consider a petition for declaratory ruling seeking U.S. market access in advance of executing a contract for satellite construction. *Star One S.A., Petition for Declaratory Ruling to Add the Star One C1 Satellite at 65° W.L. to the Permitted Space Station List*, 19 FCC Rcd 16334, ¶ 15 (2004) (acknowledging that Star One had not yet met the contract execution or construction milestones).

[23] *In re KaStarCom World Satellite LLC*, DA 01-1687 (rel. Aug 3, 2001).

intended to be located at effectively the same location as KaStarCom's --111.1° W.L.[24] Even though Telesat Canada had foregone the opportunity to participate in the processing round, and even though KaStarCom already held an authorization for the same location that Telesat Canada sought to use,[25] the Commission accepted for filing and ultimately granted Telesat Canada's market access request, explaining that each of Telesat Canada and KaStarCom would be expected to comply with the results of future frequency coordination.[26]

The following year, in its *Space Station Licensing Reform Order*, the Commission confirmed that its new satellite licensing procedures did not change its existing policy to consider market access requests regardless whether another party already was authorized in the band at issue. The Commission specifically contemplated situations where it would be faced with (i) a non-U.S.-licensed entity to whom it had granted market access but who had not yet launched, and (ii) a subsequently filed request for market access from another non-U.S.-licensed entity. The Commission indicated that it would consider and grant the requests from two or more non-U.S.-licensed satellite operators in such a situation, imposing conditions to avoid harmful interference, as appropriate.[27] Thus, the existence of ICO's and TMI's market access authorizations does not preclude consideration or grant of a market access request by Inmarsat, another non-U.S.-licensed MSS operator.[28]

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24 *Telesat Canada, Petition for Declaratory Ruling for Inclusion of Anik F2 on the Permitted Space Station List*, *Petition for Declaratory Ruling to Serve the U.S. Market Using Ka-band Capacity on Anik F2*, 17 FCC Rcd 25287 (2002) ("*Telesat*").

25 *Id.* ¶ 25.

26 *Id.* ¶¶ 25-26.

27 *Space Station Licensing Reform Order* at ¶ 296.

28 The Commission most recently affirmed this procedure authorizing access by more than one non-U.S.-licensed satellite operator in granting Loral's request for market access at 121° W.L. under a Papua New Guinea license despite protests from New Skies which stated its intentions to serve the U.S. market pursuant to a Dutch license at 120.8° W.L. *Loral*

Grant of this request is further supported by the fact that the Commission has a readily available alternative to resolve any possible conflicts among TMI, ICO and Inmarsat. Twelve MHz of MSS uplink spectrum and 12 MHz of MSS downlink spectrum currently are available for assignment as a result of three entities recently tendering their 2 GHz MSS licenses for cancellation.[29] The availability of that unassigned spectrum provides a unique opportunity for the Commission also to advance its policy of ensuring there are at least three initial competitors in a nascent frequency band.[30] Moreover, granting this request allows the Commission to accommodate Inmarsat's 2 GHz system with a spectrum assignment equal to TMI's and ICO's, thereby (i) limiting the amount of 2 GHz spectrum assigned to each non-U.S.-licensed 2 GHz MSS system, and (ii) avoiding the problems associated with assigning two non-U.S.-licensed entities (TMI and ICO) so much 2 GHz spectrum that other 2 GHz service providers are unreasonably precluded from access to the U.S. market.[31]

The Commission has laid the groundwork for assigning returned spectrum, originally licensed in a 2 GHz MSS processing round, to a subsequent applicant. On at least four occasions, the Commission has repeated that it has neither policies nor rules for reassigning returned 2 GHz MSS spectrum:

- In 2000, in adopting 2 GHz service rules, the Commission plainly stated: "[2 GHz s]pectrum abandoned by authorized systems may be available for expansion of systems

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Spacecom Corp., Petition for Declaratory Ruling to Add Telstar 13 to the Permitted Space Station List, 18 FCC Rcd 16374 (2003).

29 Public Notice, *Comments Concerning Use of Portions of Returned 2 GHz Mobile Satellite Service Frequencies*, IB Docket No. 05-220 (rel. June 29, 2005); Public Notice, *Comments Concerning Use of Portions of Returned 2 GHz Mobile Satellite Service Frequencies*, IB Docket No. 05-221 (rel. June 29, 2005).

30 *See Space Station Licensing Reform Order* at ¶¶ 61-64.

31 *See id.* ¶ 25.

that are operational and require additional spectrum. *We do not, however, establish a policy or rule for redistribution of abandoned spectrum here*."[32]

- In 2002, when proposing satellite licensing reform, the Commission articulated: "The *2 GHz Order* did not specify any policy regarding cases in which a licensee is not able to implement its system. Rather, we stated that *we would decide whether to redistribute the spectrum or allow new entrants* at the time any license is cancelled."[33] The Commission expressly noted: "We emphasize that we are not addressing this 2 GHz issue in this proceeding . . . ."[34]

- In 2003, the Commission confirmed that, "[a]s we previously stated in *2 GHz MSS R&O*, *we have not established nor do we do so here any policy or rule regarding the use of additional abandoned spectrum* that may result after future MSS milestone reviews are completed."[35]

- And, just last year, in a 2004 decision reinstating TMI's revoked 2 GHz Letter of Intent authorization, the Commission noted approvingly its prior affirmation that its "policy for reassignment of 2 GHz MSS spectrum freed as a result of future milestone rulings [has been] left for later determination."[36]

Indeed, in that 2004 *TMI Order*, the Commission invited this type of a market access request for 2 GHz MSS spectrum, outside the context of a processing round, in a case where, as here, 2 GHz spectrum became available due to licenses being surrendered, revoked or rendered void.[37] The Commission thus has provided an open invitation for post-first-2 GHz band-processing-round applications, such as this one.

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32 *Establishment of Policies & Service Rules for the Mobile Satellite Service in the 2 GHz Band*, 15 FCC Rcd 16127, 16139 ¶ 18 (2000) (emphasis added).

33 *Amendment of the Commission's Space Station Licensing Rules & Policies*, 17 FCC Rcd 3847, 3864 ¶ 48 (2002) (emphasis added) (footnote omitted).

34 *Id.* at n.54.

35 *Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems*, 18 FCC Rcd 2223, 2240 ¶ 32 (2003) (emphasis added).

36 *TMI Communications and Company, Limited Partnership and TerreStar Networks, Inc. Application for Review and Request for Stay*, 19 FCC Rcd 12603, 12621 ¶ 52 & n.97 (2004).

37 *Id.*

E. National Security, Law Enforcement and Public Safety

In *DISCO II*, the Commission identified law enforcement, national security and public safety concerns as part of the public interest analysis for determining whether a non-U.S. satellite should be permitted to provide service in the United States market.[38] As described above, Inmarsat has a rich and diverse history of serving these constituents, both in the United States and internationally. The 2 GHz band will allow Inmarsat to continue its legacy of supporting the needs of the U.S. military, civil defense, homeland security providers, and first responders by launching increasingly sophisticated and efficient spacecraft that are available at all times – even in times of crisis or disaster when terrestrial systems often fail. Through its 2 GHz services, Inmarsat will continue to strive to meet the ever-evolving demands of federal, state and local government agencies responsible for national security, law enforcement and public safety. Moreover, Inmarsat is committed to coordinating with U.S. law enforcement agencies to address their legal intercept and surveillance concerns. In this regard, with respect to its 2 GHz MSS system, Inmarsat intends to route all communications that originate or terminate in the U.S. through gateway earth stations located in the U.S. Inmarsat – as a global MSS operator – is uniquely situated to serve the communications needs of its U.S. customers beyond the U.S. via a seamless global service. No entity currently authorized to provide 2 GHz MSS in the U.S. is able to, or aims to, provide such a global service to its U.S. customers.

II. SPECIFIC INFORMATION REQUIRED BY COMMISSION RULES

The information provided in this Petition, its associated Appendices, and the accompanying FCC Form 312 and Schedule S demonstrate that Inmarsat satisfies the Commission's requirements for grant of market access.

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38 *DISCO II* at ¶ 179-82.

A. Name, Address, And Phone Numbers Of Applicant and Contacts (25.114(c)(1), (2))

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B. Authorization Requested (25.114(c)(3))

As described above, Inmarsat seeks authority to serve the United States with a U.K.-authorized MSS spacecraft to be located at 113º W.L., with MSS service links in the 2000-2020 MHz and 2180-2200 MHz segments of the 2 GHz band, and with FSS feeder links in the 13.80-14.00 GHz and 11.5-11.7 GHz portions of the extended Ku Band. Inmarsat requests a 2 GHz spectrum assignment equal in size to TMI's and ICO's, but no less than 2 x 4 MHz in any event. The 113° W.L. orbital location provides reasonable elevation angles to most of the United States, Puerto Rico, and the U.S. Virgin Islands. *See* Appendix B at Section B.2. Appendix B at

Section B.3 provides a depiction of the spacecraft's planned beam coverage of those geographic areas. Inmarsat intends to operate on a non-common carrier basis.

C. Service Description (25.114(d)(4))

As set forth more fully above in Section I.B and in Appendix A, Inmarsat's 2 GHz MSS system will provide next-generation mobile satellite service throughout the U.S., including areas that are currently unserved or underserved by the terrestrial wireless providers. Appendix B (Technical Description) and Schedule S address additional technical requirements set forth in Section 25.114(d)(4).

D. General Description Of Overall System Facilities, Operations (25.114(d)(1))

This system will use the 2000-2020 MHz uplink and 2180-2200 MHz downlink MSS bands for links between the satellite and the user terminals. All signals to and from users will be connected back to gateway earth stations using the feeder links, which will operate in the 11.5-11.7 GHz and 13.8-14.0 GHz bands. Communications between mobile users on this Inmarsat system and other networks, as well as mobile-to-mobile calls on this Inmarsat system, will pass through one of two gateway earth stations in the U.S. This 2 GHz MSS system is designed to operate with a variety of user terminals, and is expected to operate on a fully integrated basis with an ancillary terrestrial component ("ATC") to provide users with full national coverage in both urban canyons and remote rural locations, in buildings as well as outdoors, ensuring the provision of a truly ubiquitous, high-quality service through a hybrid network. ATC authority will be the subject of a future application. *See* Appendix A for further information.

A complete narrative technical description of Inmarsat's proposed GSO MSS system is contained in Technical Description attached as Appendix B.

E. Schedule and Milestones (25.114(c)(12))

Inmarsat plans to implement the Inmarsat 2 GHz satellite in compliance with the Commission's milestones. Assuming grant of this request in 2005 or early 2006, Inmarsat intends to launch this spacecraft by the end of 2010. Inmarsat intends to satisfy the following standard Commission milestones:

Event	Timing
Contract Execution	Grant plus 1 year
Critical Design Review	Grant plus 2 years
Commence Construction	Grant plus 3 years
Launch and Operate	Grant plus 5 years

F. Technical Rule Compliance

The Inmarsat 2 GHz satellite will be maintained in longitude within ±0.05° of its nominal orbital location for all latitudes within ±3.0° of the equator. Thus, operations of the Inmarsat 2 GHz MSS system will be consistent with Commission requirements regarding longitudinal tolerance, which expressly do not apply to MSS spacecraft. *Mitigation of Orbital Debris*, 19 FCC Rcd 11567 (para. 44) (2004). Moreover, the Inmarsat 2 GHz satellite will be operated in a manner consistent with the Commission's requirements for inclined orbit satellite operations, as specified in § 25.280 of the Commission's rules. *See* Appendix B at B.13.

The Technical Description at Appendix B offers a narrative description of the technical aspects of the Inmarsat 2 GHz system, and addresses in detail Inmarsat's compliance with the Commission's technical rules for authorization of satellite systems. For the Commission's convenience, Appendix D includes a table, outlining the applicable technical rules and noting where the rule requirements are addressed in this request.

G. Specific 2 GHz Mobile Satellite Service Considerations (25.143)

This application addresses each of the requirements set forth in Section 25.143 of the Commission's rules in the Form 312, this narrative at Sections II.A-F, I, Appendix B at Sections B.2, B.3 and B.21, and Appendix D.

H. Requests For Waivers

Inmarsat requests a waiver of the Commission's rules to the extent specified below.

First, Inmarsat seeks waiver of the Commission's rules to operate TT&C and feeder links for its GSO MSS network in the 11.5-11.7 GHz portion of the extended Ku band. Footnote NG104 of Section 2.106 of the Commission's rules limits the use of the 10.7-11.7 GHz to FSS use by international systems.[39] The Commission instituted this limit in order "to avoid ubiquitous deployment of FSS stations"[40] and to "limit the number of FSS earth stations with which the terrestrial fixed service would be required to coordinate."[41] The Commission has observed, however, "that it would not disserve the policy objective of NG104 to allow NGSO FSS gateway stations to operate in the bands in question, because the total number of gateway stations would be relatively small."[42] Further, in the *2 GHz MSS* rulemaking, the Commission remarked "that it might be appropriate to generally permit use of 10.7- 11.7 GHz . . . for GSO

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39 47 C.F.R. § 2.106.

40 *The Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band*, 14 FCC Rcd 4843, 4867 (1999) ("*2 GHz MSS NPRM*").

41 *GE American Communications, Inc., for Modification of Authorizations to Construct, Launch and Operate Space Stations in the Fixed Satellite Service and for Special Temporary Authority to Test Space Station at 72° W.L.*, 15 FCC Rcd 3385, ¶ 13 (1999).

42 *See Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems, in the Ku-Band Frequency Range*, 16 FCC Rcd 4096, ¶ 31 and n.65 (2000) (noting that most Ku NGSO FSS applicants proposed to deploy fewer than five such gateway stations in the U.S).

MSS feeder links, because '[t]ypically, the number of GSO MSS feeder link earth stations is small, and may present fewer constraints for terrestrial systems . . .'"[43]

For these reasons, the Commission granted Boeing a waiver of NG104 to allow Boeing to use this same band for GSO MSS feeder links, based on the same grounds presented here.[44] Inmarsat plans to locate two feeder link earth station facilities in the United States to communicate with this 2 GHz MSS system. In granting Boeing's waiver request, the Commission noted that, "the incremental impact of [two feeder-link earth stations] should not increase the frequency coordination burden on terrestrial wireless services significantly more than the existing permitted use of those bands by an international system or gateway stations for an NGSO FSS system."[45] In addition, Inmarsat intends to coordinate the location of its two feeder link earth stations in the U.S. with terrestrial operations in the band in accordance with Section 25.203(c) of the Commission's rules. Therefore, Inmarsat's proposed feeder links in the extended Ku band would not contravene the underlying purpose of the Commission's restriction on use of the 10.7-11.7 GHz band, and good cause exists for granting Inmarsat's requested waiver.

Second, Inmarsat requests a waiver of the Commission's rules, to the extent that it may be necessary, to permit some flexibility in the entry of information required in the Schedule S submitted with this application. The advanced design of the Inmarsat 2 GHz satellite design does not comport with certain requirements of the Schedule S form, as described in Section B.22 of Appendix B.

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[43] *Applications of the Boeing Company*, 18 FCC Rcd 12317, ¶ 15 (2003) ("*Boeing*").

[44] *Id.* ¶¶ 14-18.

[45] *Id.* ¶ 16.

I. Information Required of Non-U.S. Licensees, Legal and Technical Qualifications (25.137)

The Inmarsat 2 GHz MSS satellite ultimately will be controlled by Inmarsat plc (f/k/a Inmarsat Group Holdings Limited), which is the parent company of the Inmarsat family of companies.

Inmarsat Global Limited, is wholly-owned by Inmarsat Ventures Limited, which is wholly-owned by Inmarsat Investments Limited, which is wholly-owned by Inmarsat Group Limited, which is wholly-owned by Inmarsat Holdings Limited, which is wholly-owned by Inmarsat plc. Each of the foregoing companies is incorporated under the laws of England and Wales and can be reached at 99 City Road, London, EC1Y IAX, United Kingdom.

The directors, officers, and senior management of Inmarsat Global Limited, who can be reached c/o Inmarsat Global Limited, 99 City Road, London, EC1Y IAX, United Kingdom, are as follows:

<u>Directors</u>
Andrew Sukawaty
Rick Medlock
Michael Butler

<u>Officers/Senior Management</u>

Andrew Sukawaty	Executive Director
Rick Medlock	Chief Financial Officer
Michael Butler	Managing Director
Richard Denny	Vice President of Satellite Network Operations
Paul Griffith	Vice President of Product Management and Marketing
Alison Horrocks	Company Secretary
Eugene Jilg	Vice President of Advanced Systems
Debra Jones	Vice President of Business Infrastructure
Perry Melton	Vice President of Partner and Commercial Relationships
Chris McLaughlin	Director, Investor and Corporate Communications

Inmarsat plc has been publicly traded on the London Stock Exchange since an IPO of common stock in June 2005. Inmarsat plc's 10% or greater shareholders are as follows.

Two funds advised by Apax Partners, a leading advisor of private equity funds in the United Kingdom, United States and Western Europe ("Apax Partners"), in the aggregate, own 16.32% of the voting shares of Inmarsat plc. One fund is formed under the laws of England, and the other is formed under the laws of Guernsey. The address of Apax Partners is 15 Portland Place, London W1B 1PT, United Kingdom.

Five funds advised by Permira, a leading European private equity firm ("Permira"), in the aggregate, own 16.32% of the voting shares of Inmarsat plc. Those funds are formed under the laws of Guernsey. Permira can be reached through Permira Advisers Limited, 20 Southampton Street, London WC2E 7QH, United Kingdom.

The directors, officers, and senior management of Inmarsat plc, who can be reached c/o Inmarsat plc, 99 City Road, London, EC1Y IAX, United Kingdom, are as follows:

<u>Directors</u>
Andrew Sukawaty
Rick Medlock
Michael Butler
John Rennocks
Bjarne Aamodt
Sir Bryan Carsberg
James Ellis, Jr.
Stephen Davidson

<u>Officers/Senior Management</u>

Andrew Sukawaty	Chief Executive Officer
Rick Medlock	Chief Financial Officer
Michael Butler	Chief Operating Officer
Alan Auckenthaler	Vice President
Richard Denny	Vice President of Satellite Network Operations
Paul Griffith	Vice President of Portfolio Management and Marketing
Alison Horrocks	Company Secretary
Eugene Jilg	Chief Technical Officer
Debra Jones	Vice President of Business Infrastructure
Perry Melton	Vice President of Partner and Commercial Relationships
Leo Mondale	Vice President of Business Development and Strategy
Rupert Pearce	Group General Counsel

The additional information required by Section 25.137 of the Commission's rules is provided elsewhere in this Petition and in the associated FCC Form 312. Inmarsat's technical qualifications are demonstrated in Section I.A. above, and in the Technical Description to this request attached as Appendix B.

III. CONCLUSION

For the foregoing reasons, granting Inmarsat access to the U.S. market at 113° W.L. to provide MSS at 2 GHz would serve the public interest, convenience and necessity, and also would fulfill the Commission's WTO commitments.

Specifically, grant of this request would enhance competition by providing MSS users (expected to include key U.S. federal and state agencies using MSS for vital communications needs) with an alternative provider of 2 GHz MSS services both in the U.S. and globally, thereby stimulating lower rates, improving service quality, and fostering technological innovation. Inmarsat's service offerings will bolster the U.S. national security infrastructure and provide the U.S. military, first responders, law enforcement and homeland security in the U.S. with a valuable tool in their mission to ensure public safety and protect U.S. citizens and interests at home and abroad. Moreover, grant of this request is consistent with the Commission's spectrum and frequency management policies.

In view of the significant public interest benefits and the absence of harm, Inmarsat respectfully requests that the Commission promptly grant this request, thereby allowing Inmarsat to serve the U.S. with MSS at 2 GHz.

Respectfully submitted,

___/s/______________________
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Counsel for Inmarsat Global Limited

September 26, 2005

APPENDIX A

DESCRIPTION OF SERVICES

Appendix A – Service Description

Introduction

Inmarsat is the world's leading provider of global mobile satellite communications. Over a period of 25 years, we have built a successful business designing, implementing and operating innovative mobile satellite networks. Inmarsat's global fleet of GSO MSS communications satellites serves maritime, aeronautical and land mobile users in the governmental, enterprise and safety sectors, using the L-band (1.5 to 1.6 GHz).

Inmarsat is planning to deploy a new system of S-Band satellites designed to complement its existing L-Band fleet and enable the provision of a new set of robust broadband and multimedia services, to users with small, personal terminals – an aspect of MSS that Inmarsat has not previously targeted This initiative will pave the way for Inmarsat to evolve its technology to service a far wider customer base with far lower barriers to entry, seamlessly complementing and extending terrestrial mobile networks and using Inmarsat's unrivalled experience in integrating terrestrial wireless 3G and satellite technology. We intend to implement these types of services on a global scale beginning with the US market.

Inmarsat's ability to serve these needs cannot be met within our existing L-band spectrum allocation, primarily because of (i) the voracious bandwidth demands of new multimedia applications, (ii) the demands of Inmarsat's very successful existing services, and (iii) the significant technical challenges involved with offering a high data rate platform to emerging multimedia services in the L–band alongside currently provided services in the L-band that have very different channelization requirements.

Technology Strategy

To deliver our S-band MSS service in the US, we will deploy a large geostationary satellite based on an expanded high-power version of the Inmarsat-4 series.

The satellite will provide the user-link to and from the mobile terminals by means of a large deployable mesh reflector and digital beam forming network. Approximately 180 satellite spot beams covering the entire coverage area will deliver sixty times re-use of frequency. This antenna arrangement offers exceptionally high EIRP and G/T to sustain high data rates in both forward and return directions. The beam arrangement will be actively reconfigurable in orbit to maintain mission flexibility. The feeder-link interconnecting the mobile users to the terrestrial network will use spectrum in the Ku band through a dual polarisation antenna. Figure 1 illustrates the system architecture for the network. The terrestrial in-fill aspect (ATC) will be the subject of a future application.

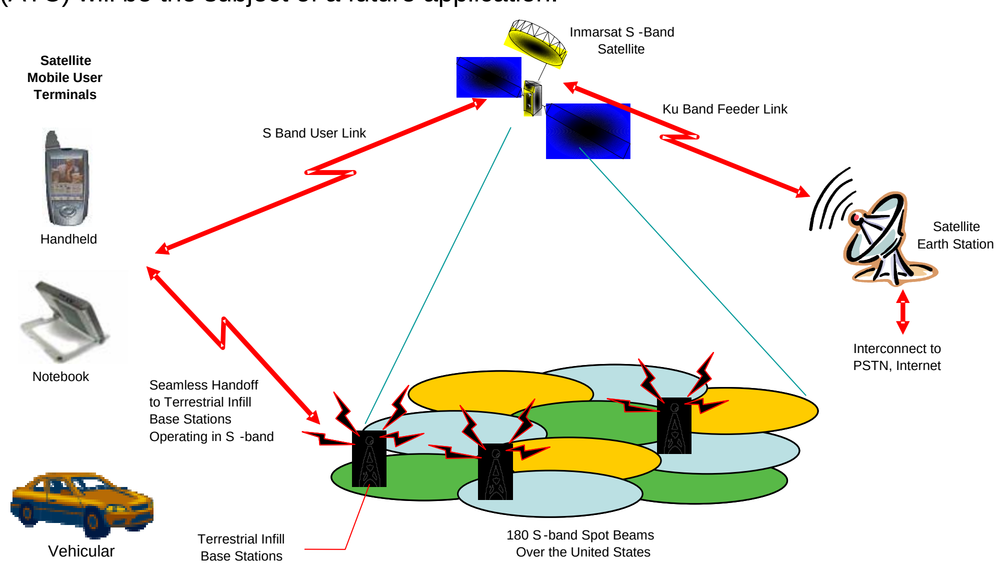

Figure 1 Inmarsat S-Band Satellite Architecture

The Inmarsat engineering philosophy stresses a balance of simplicity, flexibility and performance, a philosophy that has guided us through an unblemished record of 10 successful satellite launches over three satellite generations. In keeping with this approach we propose an initial ground infrastructure based on a classic star formation topology with all user traffic routed through a transparent satellite transponder to and from two satellite earth stations located in the U.S. (operating in dual-redundant hot standby configuration) which provide interconnection to terrestrial telecommunications networks and mobile-to-mobile switching. The option of on-board direct S-band to S-band communication is available for future applications.

The satellite payload uses a digital signal processor for switching and digital beam forming. The flexible digital beam former and payload switching will permit instantaneous reconfiguration of the satellite payload allowing beams to be moved and reshaped and channels to be redeployed in real-time as demand patterns change throughout the day.

The payload will be sized to accommodate a wide range of user terminal classes including small, personal terminals, and other mobile, vehicular and portable devices.

It is common, today, for mobile devices to support two, three or more wireless technologies and be able to handoff between them. We believe that the increasing use of multi-band mobile terminals will lead inevitably to support for satellite at minimal cost and will offer dramatic increases in geographical coverage with broadband data rates. Advancing terminal technology will permit users to be agnostic to the system their applications are carried over. Mobility between wireless technologies will be the norm, with seamless handoff occurring between satellite and terrestrial networks in a 'best connected' fashion.

We will support advanced air interface techniques for maximising the efficient use of the available spectrum, including dynamically adaptive turbo coding and space-time techniques tailored to the instantaneous link quality in both forward and return directions.

The Inmarsat S-band system places no inherent constraints on the choice of air interface technology used in the user terminal. Since we are able to dynamically aggregate multiple adjacent 250 kHz sub-bands into larger transparent channels we are able to support multiple air interface technologies. Table 1 illustrates the characteristics of the most common mobile air interfaces in use in typical terrestrial and satellite mobile systems. The Inmarsat S-band satellite offers support for all the satellite enabled air interfaces and, with modest adaptations, will support satellite adapted variants of the remaining standards. By supporting this degree of flexibility, we can balance technology re-use, user terminal cost, complexity and spectrum efficiency.

Mobile Air Interface Technology	Channel Bandwidth	Modulation	Multiple Access	Satellite Enabled
GSM	200 kHz	GMSK	TDMA	Satellite Variant Available
WCDMA	5 MHz	QPSK	CDMA	Satellite Variant Available
CDMA-2000 1x EVDO	1.25 MHz	BPSK to 16 QAM	CDMA, TDM	With Adaptations
WiMAX	3.5-10MHz	Multicarrier QPSK to 64 QAM	OFDMA	With Adaptations
GMR-1	200 kHz	QPSK	TDMA	Native Satellite Air Interface
IAI-2	200 kHz	QPSK, 16 QAM	TDMA	Native Satellite Air Interface

Table 1 - Characteristics of Common Mobile Satellite and Terrestrial Air Interfaces

Commercial Benefits

Our objective is to offer a mobile communications service that not only eliminates the cost and performance gap that traditionally separates terrestrial and satellite systems but that also enables ubiquitous mobile multimedia capabilities that are not currently available terrestrially. We believe these services to be provided by Inmarsat will allow the true benefits of the coverage advantage of satellites to be available to American users.

We recognise that the traditional labels of 'voice' and 'data' are no longer adequate to characterise the traffic carried by our network. We are moving towards a blurring of boundaries between communications infrastructure and media distribution, between consumer and publisher. Our system therefore has full adaptability built-in from inception, with no inherent constraints on the asymmetry of the traffic distribution or the application characteristics.

The system will deliver advanced high data-rate mobile services virtually anywhere in the US including the most remote and inaccessible areas. Services to remote users will be offered at prices similar to those urban users would incur for terrestrial broadband wireless mobile services, thus increasing accessibility and adoption rates in underserved areas.

The success of our commercial objectives is dependent on ensuring open interfaces and a flexible relationship with other network technologies. A typical user may receive service from a personal/corporate picocell in a home/office environment, and seamlessly hand off to a metropolitan cellular network in an urban environment, and then to a satellite umbrella cell for full uninterrupted coverage as the user moves between cities - at all times remaining connected to the network that is the most cost effective for delivering their services.

Ensuring flexible interoperability between terrestrial networks and satellite demands a detailed understanding of the issues of mobile billing, satellite network interconnect, mobile IP and mobility management – disciplines in which Inmarsat has unrivalled expertise.

Services and Applications

An MSS system cannot be assessed solely in terms of satellite performance. Inmarsat recognises that the satellite is just one of a number of vital factors that must be considered to succeed. Our experience is that care and attention to detail over all elements of system performance is crucial to delivering a class-leading communications platform.

Inmarsat will support a wide range of multimedia applications over the S-Band satellite. The range of data-rates and traffic characteristics of typical applications that we will support is illustrated in Table 2.

Application	Antenna Class[1]	Bit Rate Variation	Typical Data Rate
Voice Telephony	handheld, palm, pocket, notebook	Constant	4 kbps
Push to Talk	handheld, palm, pocket, notebook	Variable	4 kbps
Data (e-mail, HTML)	handheld, palm, pocket, notebook	Variable	50 kbps – 2 MBps+
Videoconferencing	handheld, palm, pocket, notebook	Constant	64 kbps (handheld screen) to 700 kbps (television quality)
Streaming Audio	handheld, palm, pocket, notebook	Constant	20 - 40 kbps per channel
Streaming Video	handheld, palm, pocket, notebook	Constant	64 kbps (handheld screen) to 700 kbps (television quality)
SCADA	handheld	Variable	500 bps to 50 kbps

Table 2 Data Rates and Traffic Characteristics of Initial Application Mix

The following sections elaborate the services that we consider to be the most important to the success of this system.

Voice

At Inmarsat we have long recognised that spectrum efficiency and audio quality are vital to deliver a cost effective high-quality satellite voice telephony service. We have invested heavily to strengthen our voice technology. For example, Inmarsat's voice codec technology currently deployed in the BGAN network is more efficient than that used by any terrestrial 3G operator (with a data rate of 4.0 kbps and a mean opinion score comparable to wire line). We will continue to use our expertise to further drive down the cost of high quality telephony so that it remains competitive with terrestrial.

At the same time Inmarsat has worked hard to ensure that Voice over IP is carried efficiently over satellite and that the terrestrial cost advantages of VoIP are not lost through satellite transmission losses. In our BGAN network we have implemented state of the art IP quality-of-service techniques and header compression algorithms to ensure that satellite VoIP is competitive with terrestrial systems in terms of both quality and bandwidth utilisation.

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1 Also includes similarly-sized vehicular antennas.

Data

Inmarsat's existing systems carry increasing quantities of IP data for commercial and enterprise users with an ever growing component of variable bit-rate web, e-mail and messaging traffic. As user demands increases, the cost per bit of services falls and this places demands on an operator to deliver flat-rate charging for broadband access – which is inherently challenging in a spectrum-limited MSS system. Inmarsat has unrivalled expertise in developing and operating variable-bit rate air interface systems with low latency, equitable capacity sharing and high utilisation rates. No other operator has a better understanding and experience in managing contention-based variable bit rate IP services over satellite for delivering low cost-per-bit and high peak bit rates.

Satellite transmission imposes particular constraints on the efficient transmission of IP traffic due to interactions between the TCP transport protocol and the long satellite round-trip-time. Inmarsat has pioneered and deployed a range of transparent and adaptive techniques for maximising bandwidth utilisation and maintaining peak data rates over the satellite link. With the use of these techniques, Inmarsat can deliver a higher performance and lower cost service than any other provider.

Multimedia

Consumers are demanding ever more sophisticated audio and video services through their mobile handsets. The power and bandwidth available from the S-band satellite will allow us to deliver audio and video streams directly to handheld terminals that offer interactivity, store-and-replay and on-demand features.

Inmarsat sees multimedia-mobile as a major business opportunity. The nature of the satellite platform allows delivery of content to unlimited numbers of users. Interactivity through the satellite return channel allows us to support a much richer range of applications than is available through other networks. Thus S-band MSS has unique advantages for delivering multimedia content.

Inmarsat MSS systems have long been used for transmitting real-time video and audio – traditionally using circuit-switched ISDN via satellite but increasingly using IP over constant-bit-rate streaming bearers. In our most recent satellite systems we have gone to extraordinary efforts to ensure that our constant bit-rate packet bearers operate with high efficiency and low jitter using interoperable, transparent and flexible quality of service management techniques. This experience is not to be found elsewhere in the MSS field and will prove invaluable in deployment of media rich applications over the S-band network.

Messaging, Supervisory Control and Data Acquisition (SCADA)

In the terrestrial arena the cost of Radio Frequency Identity Tags (RFIDs) has dropped to a level where a tipping-point has been achieved that suddenly permits a huge range of short-range asset tracking and inventory applications to become cost effective.

We believe that the performance of the new generation of MSS satellites will lead to a similar explosion in long-range applications, through a combination of reduced remote transceiver cost and increased satellite performance. This will be made possible by taking advantage of the increased power and functionality of our S-band satellites to enable much smaller and less expensive, low-powered, remote-controlled devices to allow better tracking and inventory of assets. And Inmarsat's full global coverage will allow this service, whether to homeland security or commercial customers, to be delivered on a truly international scale.

However to deploy a mission critical system that scales cost effectively to serve huge numbers of terminals and high volumes of low value intermittent traffic requires considerable care. No other provider has the techniques and experience that Inmarsat can bring to this challenge.

Inmarsat's long heritage in SCADA technology and safety services (through Inmarsat C, Mini-C, D, D+, E and E+) will be vital to deliver the promise of low-cost satellite messaging. Key to success in this area is the availability of rugged, low cost, low power equipment – using highly integrated high-volume low-cost ASIC technology - an area in which we have considerable expertise.

The areas where this technology is applicable include

- remote instrumentation
- distress beacons
- environmental and safety monitoring
- asset tracking, inventory and compliance monitoring
- vessel and container tracking for port and airport security
- theft tracking
- emergency and accident reporting
- remote diagnostics

It will now be cost effective to fit all cargo ships, aircraft and trucks with satellite tracking to maintain security monitor vital safety parameters, and improve logistics control.

Inmarsat's new generation MSS satellite system will include a SCADA/messaging platform with a key role in maintaining homeland security and national defence, with unrivalled geographic reach and no dependency on vulnerable local terrestrial infrastructure.

Remote and Rural Access

Inmarsat recognises that a stated policy goal of the FCC is to deliver broadband services to rural users in America with the aim of narrowing the information divide and to deliver the economic benefits of the information economy to all demographic groups. We view the provision of mobile satellite broadband services as a key enabler to eliminate distance disparities and ensure timely access to information resources to all.

The Inmarsat S-band system will bring affordable multimedia broadband mobile communications to users in remote and rural areas – dramatically expanding access to sophisticated communications systems and services for users that historically have been underserved.

Satellite services are particularly appropriate for remote and rural users because of the unrivalled geographic reach achievable from the geostationary arc. Satellite in mobile broadband favours the remote user – it is in fact less costly to serve users in isolated and lightly-loaded spot beams because of the nature of spot-beam frequency reuse. We envisage that locally tailored services with meshing and hand-off to and from isolated local networks will be a common pattern of use of the S-band system

Inmarsat's S band service can augment other efforts to provide rural service. By building on our existing capability to provide secure, high-quality, dependable connectivity to remote locations (ships at sea, mobile command posts, journalists, remote medical triage stations), Inmarsat will allow itinerant workers who serve commercial, social and security needs of rural communities the same mobile connectivity and access to content that they enjoy when they operate in urban areas.

Location Based Services

Inmarsat's S-band MSS platform will be capable of pinpointing user location in real time to with a platform for delivery of location based services including telematics, toll charging, mapping and navigation, locally targeted advertising and information services, news, travel reports, geographically targeted emergency assistance, automatic emergency services notification, agricultural and fisheries data, remote automotive diagnostics and law enforcement.

Inmarsat has considerable experience in integrating GPS with value added location services and we therefore view this type of technology as mature and well understood. For example, the Inmarsat BGAN network includes capability to support commercial location based services and the phase 1 and phase 2 Enhanced 911 directives using GPS without reliance on vulnerable terrestrial base-stations for location triangulation. Our experience in the area of location services will be applied directly to ensure a rapid deployment of our system to meet these and future commercial and regulatory needs.

Multicast and Netted Transmission

Inmarsat views multicast and netted communications as a core component of this system. Besides satellite MSS, no single technology can simultaneously offer the same efficiency of geographical reach to unlimited receivers combined with mobility and interactivity. We recognise that future netted multimedia services will serve increasingly geographically diverse users with far greater degrees of interactivity and spontaneity.

We envisage that a truly effective MSS system must support the capability to maintain ad-hoc interactive real-time audio, video and text communications between members of communities and closed user groups with no limit to distance. There are rapid developments in the field of virtual presence, conferencing, push-to-talk, push-to-video and collaboration applications. It is crucial, therefore that the MSS platform must incorporate open-standards application support and quality of service adaptations to permit such services to be supported efficiently. Inmarsat is unique in having both the expertise and experience to deliver such a platform.

Inmarsat has been working aggressively over a number of years to develop satellite adaptations to support standard IP multicast for civil and governmental applications using the BGAN network, adaptations which will be directly applicable to the S-band platform. Our ongoing work in this area is an illustration of our determination to be at the forefront of support for these services. We believe that MSS at S-band will offer huge opportunities multicast and our expertise in this area will prove especially beneficial.

Inmarsat recognises that netted communications is a growing requirement in the law enforcement and emergency response communities. When a single agency such as the US Coast Guard, responds to a law enforcement or disaster event, it increasingly looks for netted communications to tie together ad-hoc response teams often spread over considerable areas. In a major wide-scale disaster, multi-agency response teams assembled “on the fly” in response to fluid situations on the ground depend on closed user groups to get mission critical information to the right first responders in a timely manner in an often congested and confusing response environment.

Satellite netted transmission via the Inmarsat S-band system will be a key component in ongoing activities to provide homeland security, to ensure emergency preparedness, and support the defence of the nation’s communications infrastructure.

Safety and Emergency Services

Inmarsat’s S-band MSS offering will provide a communications service that can be relied on by public safety, defence and health personnel in the event of civil emergency. Inmarsat has a long heritage in distress and safety services to maritime users and we therefore offer a unique understanding of the needs and operation of a high-availability, safety-critical satellite telecommunications service.

A crucial feature that differentiates an MSS system from a terrestrial mobile network is the infrastructure-free network on the ground. Without reliance on a vulnerable network of local base-stations which may be disabled or destroyed in civil emergencies, an MSS system offers a robust platform for communications for first responders, disaster relief and homeland security.

Using securable, redundant and geographically separated earth stations to support telemetry, telecommand and traffic-interconnect the Inmarsat system will deliver the assurance of high availability service based on proven technology.

Inmarsat recognises that communications interoperability is a crucial requirement. It has long been recognised that America lacks a comprehensive technical solution to interoperability for first responder communications. As a result, the effectiveness of first responder teams in the critical first hours at a remote location for wild fire suppression or a disaster site where a hurricane, earthquake or similar natural disaster, or an act of terrorism, has destroyed the existing communications infrastructure is substantially degraded because terrestrial based communications are lacking. Rural first response agencies are increasingly looking to satellite-based mobile IP solutions to compliment terrestrial technologies that drop off as they move deep into their rural territories. Even in highly urbanized areas such as southern California, first responder jurisdictions include rural areas lacking in terrestrial connectivity. Mobile command posts for law enforcement and disaster response require a satellite based solution to get information gathered at a remote site into the hands of decision-makers at distant regional or national command centres. FEMA and other disaster response agencies already depend on Inmarsat for voice and data communications in an emergency. Using its IP-technology based on our BGAN Inmarsat-4 heritage, we will offer a mobile broadband solution that can augment communications already deployed in the field, offering an immediately available and cost effective solution to an issue that has stymied public security officials in rural and urban areas for decades.

Interoperability is also a key requirement for emerging homeland security needs. The US border patrol, for example, operates in areas that move in and out of terrestrial coverage, hampering their ability to respond to growing challenges. Deployment of a satellite-based solution with a mobile broadband offering would make available the connectivity that modern law enforcement requires without a specific, federally funded effort to build out terrestrial infrastructure in remote border areas where the absence of any commercial opportunity puts the entire burden on the federal budget and requires policy makers to face a zero-sum choice between supporting border law enforcement or the rural consumer.

The Inmarsat 2 GHz system offers unprecedented flexibility in capacity reconfiguration permitting ad-hoc and flash redeployment to support civil defence actions and homeland security. Inmarsat brings considerable experience in serving the needs of emergency services, Army, Navy, air-traffic control and Coast Guard users with support for key features including multi-level precedence/pre-emption, provision of secure encryption, integrity-protection and leasing arrangements.

By delivering services over a higher capacity, lower cost S-band satellite platform Inmarsat can deliver interoperable broadband communications to the entire community of civil defence and homeland security users. In the past Inmarsat terminals have been primarily the preserve of certain U.S. federal government users, but now reliable, inexpensive and secure dual-mode personal satellite/terrestrial communications readily can be made available to all emergency personnel, local, state and federal alike.

Summary and Conclusion

The entry of Inmarsat in the S-band will increase choice, promote competition and spur innovation in services and applications in the US mobile telecommunications market. Inmarsat's offering will drive down the cost of services to the user through an evolution of our current proven, flexible satellite platform. Our practical experience and unrivalled delivery record over three generations of MSS satellites is assurance that we will offer a capable, credible and robust system delivered on time and with service prices comparable to those of our competitors.

Many competing players in the sector have tried and failed to deliver a commercial MSS system despite unprecedented capital expenditure. Inmarsat has succeeded where others have failed by never losing sight of the realistic value of MSS services and by building incrementally on successive generations of technology. Our reputation for low cost, technical rigour, innovation and class-leading performance is unchallenged. We continue to challenge performance boundaries: each generation of satellites we deploy has been (at the time of its launch) the most powerful satellite in its class and each generation has delivered a capacity per satellite larger than the sum of the capacity all of our previous satellite generations deployed to that date.

Inmarsat will ensure that S-band MSS succeeds both technically and commercially. We are committed to delivering a system that competes with terrestrial and satellite alternatives, which will offer mobile multimedia to consumers and enterprise/government customers, which will deliver broadband to remote, rural and underserved users, and which will provide a secure communications platform for homeland security.

APPENDIX B

TECHNICAL DESCRIPTION

INMARSAT 2GHZ

APPENDIX B

TECHNICAL DESCRIPTION

B.1 GENERAL DESCRIPTION

The INMARSAT 2GHZ satellite is designed to provide Mobile-Satellite Services to small User Terminals (“UTs”) in the USA. The satellite will have the capability of receiving transmissions in the 2000-2020 MHz band and transmitting in the 2180-2200 MHz band (“S-band”). Feeder link operations will use the 13.8-14.0 GHz and 11.5-11.7 GHz bands (“extended Ku-bands”) with two gateway stations located within CONUS.

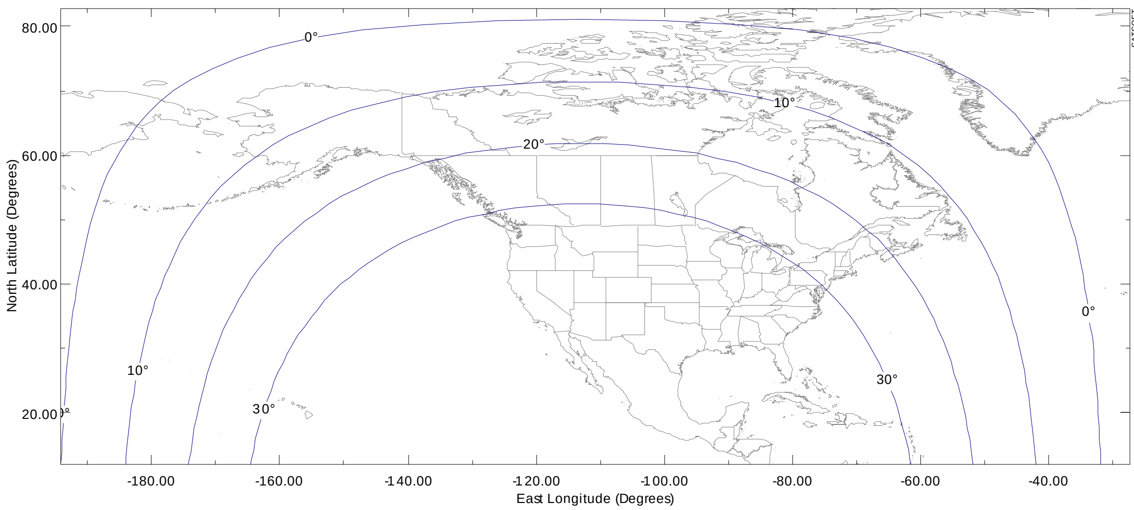
The INMARSAT 2GHZ satellite will use a 17.5 m aperture unfurlable reflector used for both transmit and receive. The reflector will be stowed during the launch and transfer orbit phases of the mission, and is deployed once the satellite is in geo-synchronous orbit. The use of a single reflector ensures that a high level of coverage congruency is provided between all transmit and receive beams.

The heart of the payload will be a digital signal processor (“DSP”) that performs the channelization and beam-forming functions. The DSP provides very fine granularity in the allocation of bandwidth to the various beams and also enables the generation of a variety of different types of beams, with the required pointing. The DSP provides the capability to steer the antenna beams to accommodate the motion of the spacecraft when operating in inclined orbit. The DSP also dynamically allocates the satellite channels to the various beams, allowing the INMARSAT 2GHZ satellite to manage variable traffic patterns.

B.2 ORBITAL LOCATION

The INMARSAT 2GHZ satellite will operate at the 113° W.L. geostationary orbital location. This orbital location was chosen because of feeder link spectrum availability and it provides reasonably high elevation angles to the majority of the service area. High elevation angles minimize the risk of signal blockage due to buildings and foliage. Figure B.2-1 shows the elevation angles from the 113° W.L. orbital location.

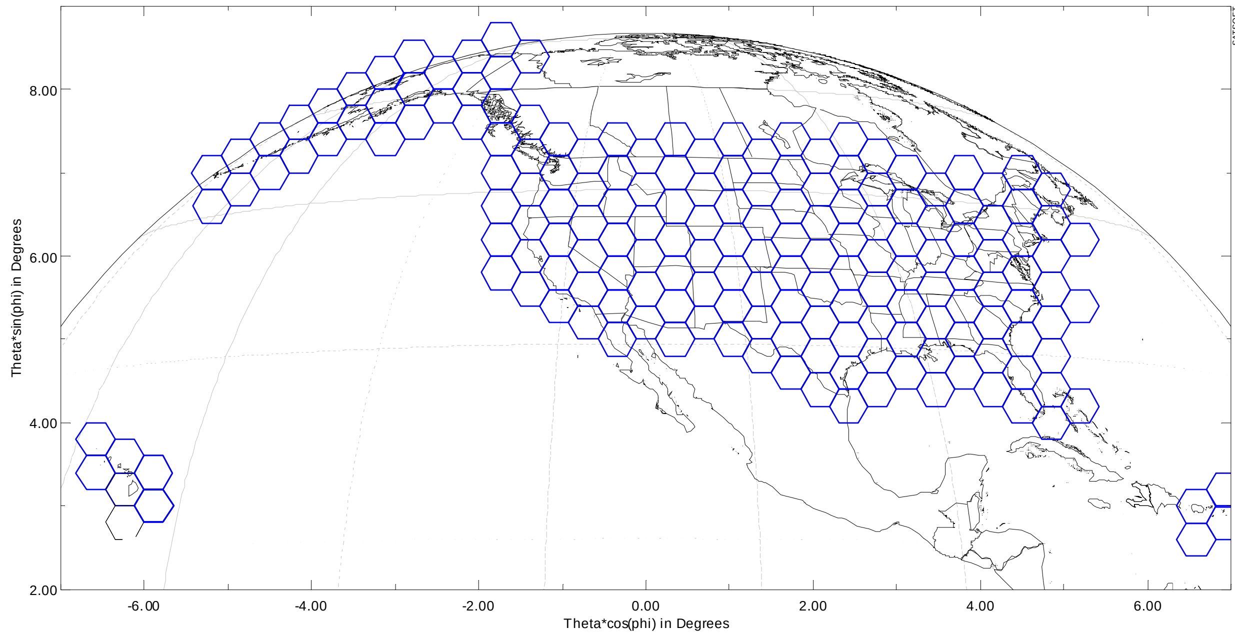
Figure B.2-1 – Elevation Angles from the 113° W.L. Orbital Location



B.3 SATELLITE COVERAGE

The INMARSAT 2GHZ satellite will provide two-way services to small user terminals using up to 180 service link spot beams. Figure B.3-1 shows the preliminary coverage of the S-band spot beams, which includes CONUS, Alaska, Hawaii, Puerto Rico and the U.S. Virgin Islands. The coverage may be refined after discussion with satellite manufacturers. The spot beam locations will be nominally identical for both the uplink and downlink directions.

Figure B.3-1 – Nominal locations of the service link spot beams.



B.4 FREQUENCY AND POLARIZATION PLANS FOR COMMUNICATIONS LINKS

The INMARSAT 2GHZ satellite will be capable of operating over any portion of the 2000-2020 MHz and 2180-2200 MHz bands. The payload is capable of being dynamically configured in-orbit to use any portion of these bands. Right Hand Circular (RHC) polarization is used on both uplink and downlink transmissions in the S-band.

The satellite's DSP dynamically allocates the satellite channels to the various beams, allowing Inmarsat to manage variable traffic patterns. There is no fixed frequency relationship between the S-band frequencies and the extended Ku-band feeder link frequencies. The S-band links are channelized onto a 250 kHz grid across the available spectrum. Channels can be aggregated to provide higher throughput. Beam forming and channelization of the transponders are realized with state of the art digital technology that enables 1560 satellite channels, in both the forward and return directions, to be switched dynamically between the various beams.

The feeder link spectrum is re-used twice by means of dual orthogonal linear polarizations. TT&C operations will take place at the edges of the specified portions of the extended Ku-band.

Table B.4-1 shows the frequency plan, polarization and connectivity of the INMARSAT 2GHZ satellite.

Table B.4-1. INMARSAT 2 GHZ Frequency Plan

	UPLINK			DOWNLINK		
Description	**Beam**	**Polarization**	**Frequency Band (MHz)**	**Beam**	**Polarization**	**Frequency Band (MHz)**
Forward Link	Large Beam (KUH)	HP	13800-13995	Spot (SD)	RHCP	2180-2200
	Large Beam (KUV)	VP	13800-13995	Spot (SD)	RHCP	2180-2200
Return Link	Spot (SU)	RHCP	2000-2020	Large Beam (KDH)	HP	11500-11695
	Spot (SU)	RHCP	2000-2020	Large Beam (KDV)	VP	11500-11695
Telecommand	Large Beam (KUH) Omni (OMNUH)	HP	13998			
Telecommand	Large Beam (KUV) Omni (OMNUV)	VP	13998			
Telemetry				Large Beam (KDH) Omni (OMNDH)	HP	11698
Telemetry				Large Beam (KDV) Omni (OMNDV)	VP	11698

B.5 SATELLITE TRANSMIT CAPABILITY

B.5.1 Feeder Downlink

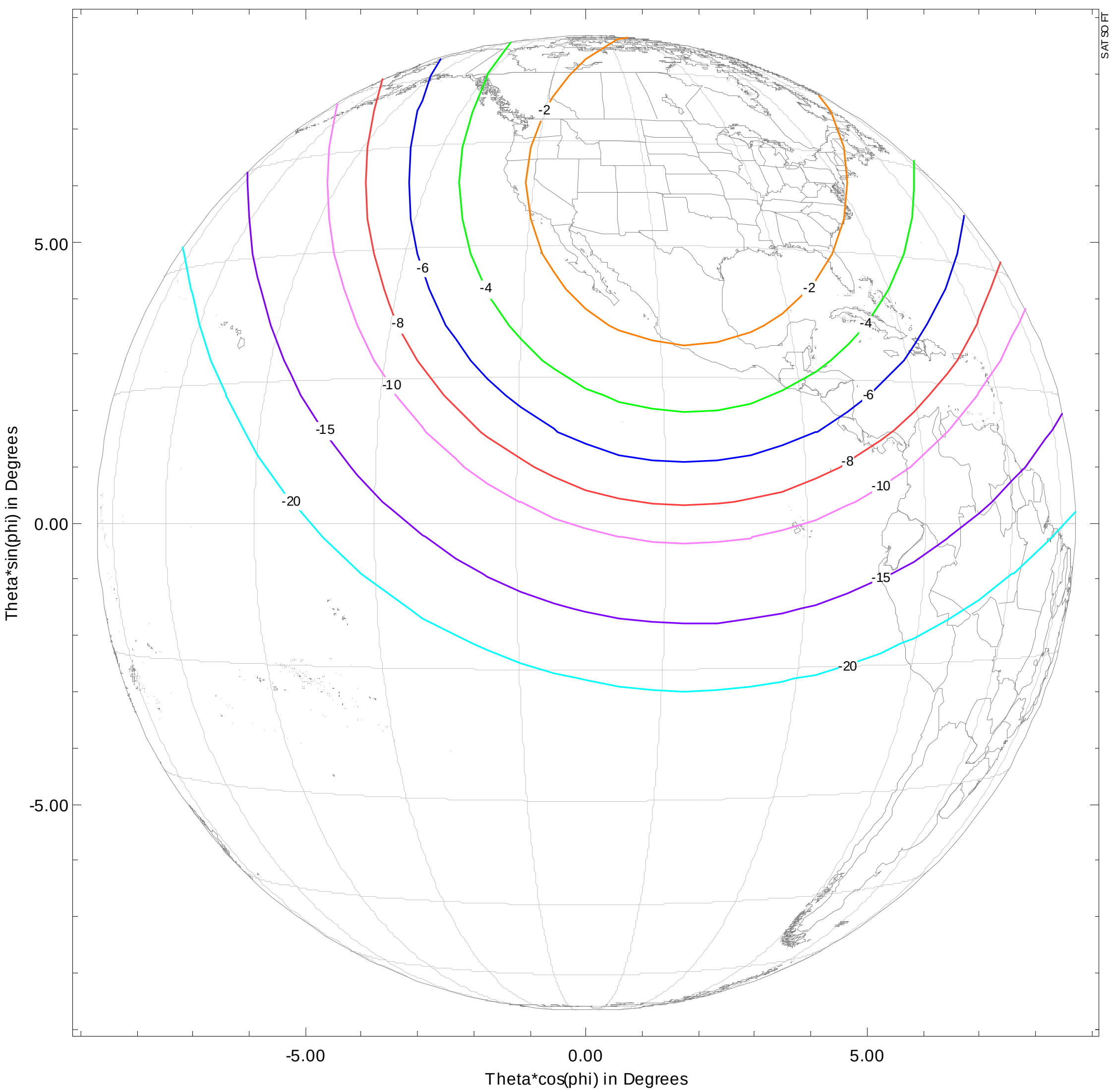
The signals received by the S-band antenna are amplified by the low noise amplifiers (LNA) and fed to the S-band pre-processor, which performs the required filtering and down-conversion of the signals to baseband, before passing them to A/D converters that feed the DSP. The DSP performs the required channelizing and beam-forming functions, and passes the signals to the required D/A converters, which then feed the Ku-band up-converter. High power amplifiers are used to provide the required amount of power to the Ku-band antenna.

The INMARSAT 2GHZ satellite provides two large downlink Ku-band beams for feeder link purposes: one in horizontal polarization (HP) and the other in vertical polarization (VP). The beams are nominally identical in each polarization. The beams have a peak gain of 27 dBi, providing a maximum of 42 dBW of downlink EIRP on each polarization. The available power to the antenna before losses is 50 watts. Typical line losses amount to 2 dB. The cross-polarization isolation of the beams is 30 dB across the service area.

Figure B.5-1 shows the gain contours of the downlink feeder link beam.

Figure B.5-1 – Downlink Feeder Link Antenna Beam Gain Contours

(Contours shown are -2, -4, -6, -8, -10, -15 and -20 dB relative to the beam peak)



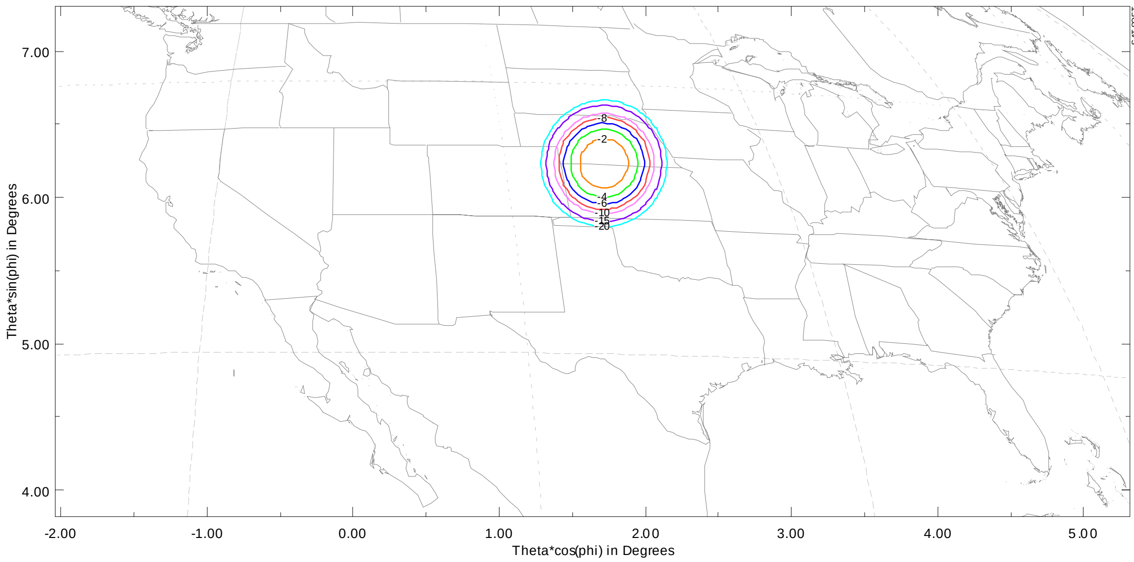
B.5.2 Service Downlink

On the forward link, the signals received from the satellite gateway earth stations are received by the Ku-band antenna, filtered and passed to the Ku-band receiver. The amplified signal is filtered and down converted and, after going through the required analog-to-digital (A/D) converters, is fed to the DSP. The DSP is responsible for breaking the signals into the appropriate 250 kHz channels, and for applying the correct beam forming coefficients to each channel. The channelized and beam-formed signals, after being converted to analog signals by digital-to-analog (D/A) converters, are then fed to the S-band post-processor, which employ SAW technology to filter and convert the signals to S-band, before feeding them to the Multi Port Amplifier (MPA). The MPA comprises Input Networks (INet), the solid-state power amplifiers (SSPA) and the Output Networks (ONet) that amplify the signal, and feed it to the appropriate feed elements.

Figure B.5-2 provides the gain contours of a typical spot beam. The spot beams transmit in RHCP only. The peak antenna gain of the spot beams is 49 dBi. The maximum available power to the antenna before losses is 3200 watts, on which there is an average line loss of 4 dB. The total available EIRP of 80 dBW is dynamically distributed among the S-band spot beams according to traffic requirements.

Figure B.5-2 – Example Downlink Spot Beam Gain Contours

(Contours shown are -2, -4, -6, -8, -10, -15, and -20 dB relative to the beam peak)



B.6 SATELLITE RECEIVE CAPABILITY

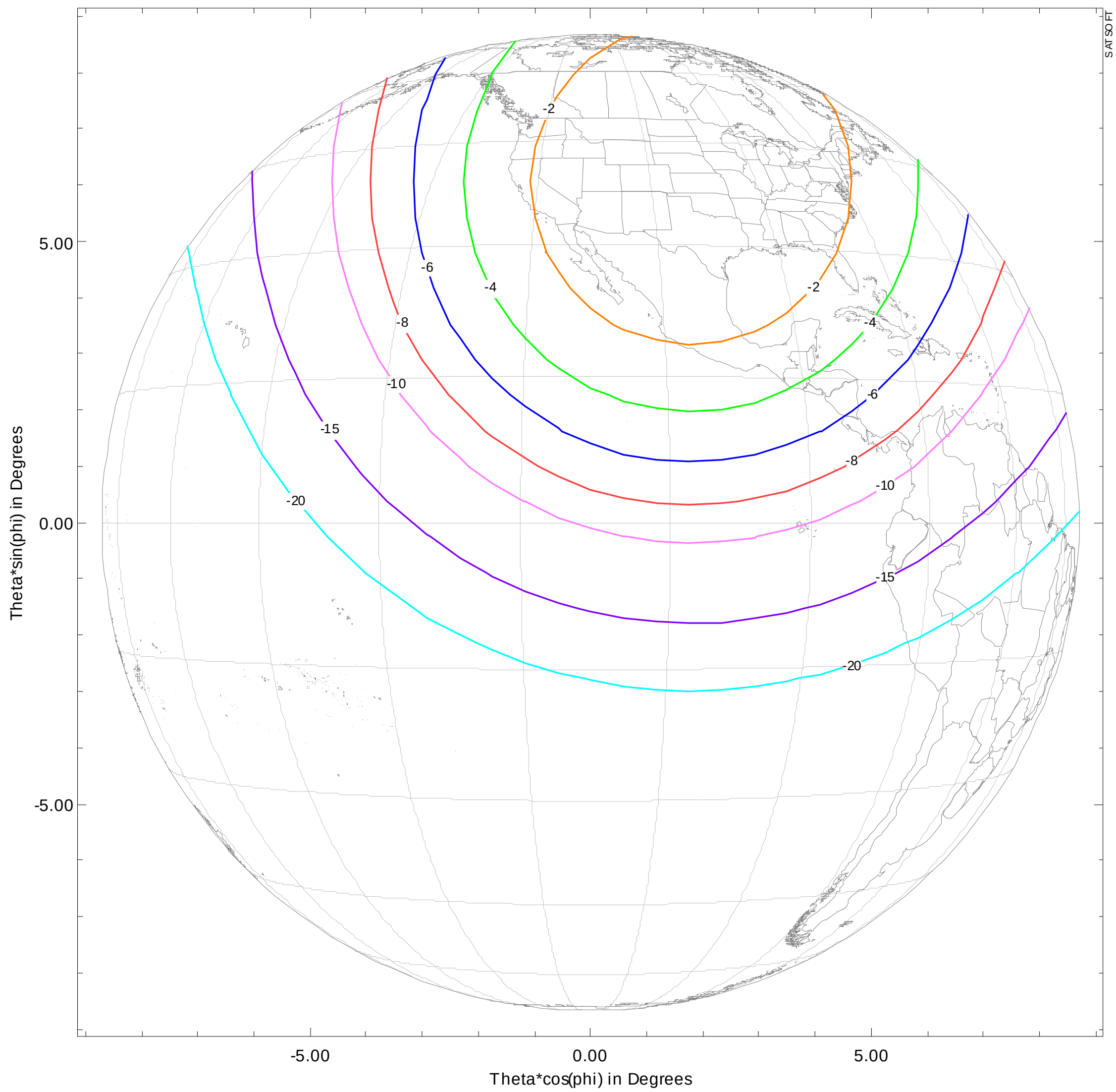
B.6.1 Feeder Uplink

The INMARSAT 2GHZ satellite employs two large Ku-band beams for feeder link operations: one in HP and the other in VP. The beams are nominally identical in each polarization. The beams have a peak gain of 27 dBi and a total system noise temperature of 625 K. The peak G/T of the feeder link beams is -1.0 dB/K. The cross-polarization isolation of the beams is 30 dB across the service area.

Figure B.6-1 shows the gain contours of the uplink feeder link beam.

Figure B.6-1 –Uplink Feeder Link Antenna Beam Gain Contours

(Contours shown are -2, -4, -6, -8, -10, -15 and -20 dB relative to the beam peak)

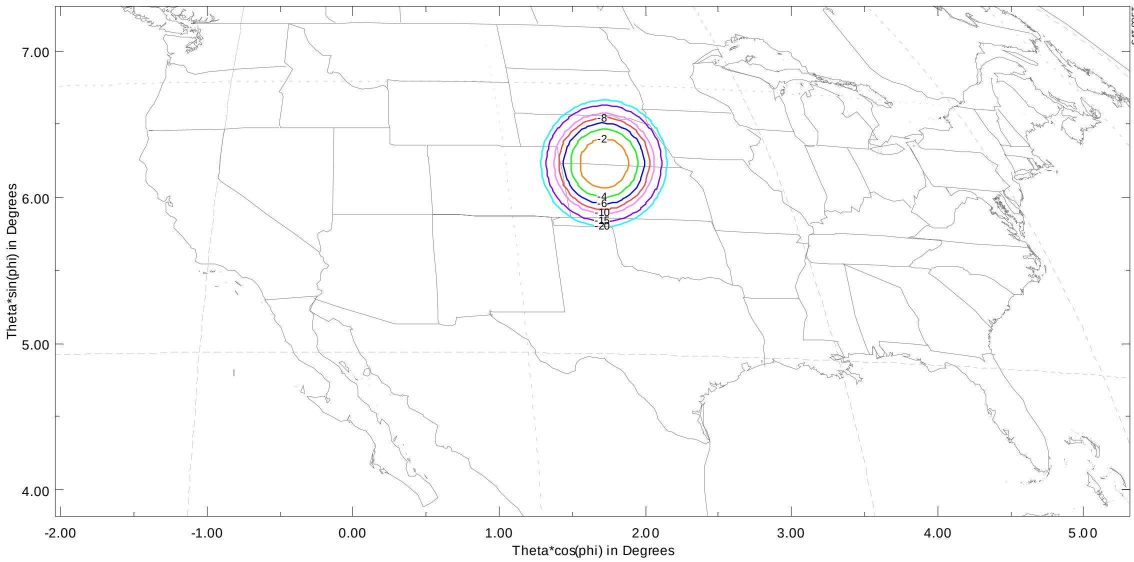


B.6.2 Service Uplink

The user link uplink utilizes the same 17.5 m reflector used for the service link downlink, achieving similar beam characteristics. The antenna gain contours of an example spot beam are given in Figure B.6-2. The peak antenna gain of the beams is 49 dBi. The spot beams receive in RHCP only. The total effective system noise temperature for the satellite spot beam receiver is approximately 630 K, including antenna losses. Therefore the beam peak G/T performance is 21.0 dB/K.

Figure B.6-2 – Example Uplink Spot Beam Antenna Gain Contours

(Contours shown are -2, -4, -6, -8, -10, -15, and -20 dB relative to the beam peak)



B.7 TRANSPONDER GAIN CONTROL AND SATURATING FLUX DENSITY

In order to ensure that the drive level to the amplifiers is kept within the specified range, and the linearity performance is maintained, a power control loop samples the current driven by the S-band SSPA’s on the forward link, and controls the gain at the Ku-band receivers, while on the return link, automatic level control circuits are used. On both the forward and return directions, the amplifiers are operated only in a linear backed-off mode, never at saturation, therefore it is not meaningful to state a saturation flux density.

The maximum “transponder” gain between output of the receiving antenna and input of the transmitting antenna is 140 dB for both the return and forward links. The gain of any transmission channel on both the forward and return links is commandable in 1 dB steps over a 16 dB range.

B.8 SATELLITE FILTER RESPONSE

The specification for the overall in-band filter response and out-of-band attenuation is dictated by the following considerations:

1. The in-band gain and group delay response must be flat enough so as not to degrade significantly the bit error rate performance of the digital carriers transmitted.

2. The out-of-band attenuation must be high enough to meet the out-of-band emission limits of §25.202(f) (1), (2) and (3).

B.9 FREQUENCY TOLERANCE AND UNWANTED EMISSIONS

The frequency translation accuracy is better than 1 part in 10^7, including periods of eclipse, over the operational life of the spacecraft

The out-of-band emissions will not exceed the limits of §25.202(f) (1), (2) and (3).

B.10 EMISSION DESIGNATORS AND ALLOCATED BANDWIDTH OF EMISSION

The communications signals will utilize carriers of varying bandwidths and different modulation schemes. All communications carriers will be digitally modulated. Typical emission designators and their associated allocated bandwidths are provided in Table B.10-1, including command and telemetry carriers.

Table B.10-1. Representative Emission Designators and Allocated Bandwidths

Emission Designator	Allocated Bandwidth
500KG7W	500 kHz
500KD7W	500 kHz
250KG7W	250 kHz
125KG7W	125 kHz
62K5G7W	62.5 kHz
1M40F3X (Telecommand)	1.4 MHz
180KG3X (Telemetry)	180 kHz

B.11 EARTH STATIONS

B.11.1 User Terminals

The INMARSAT 2GHZ satellite is designed to operate with a variety of mobile, vehicular and portable user terminals. *See* Appendix A. Typical antenna gains of the UTs are expected to range between -6 dBi to 12 dBi.

B.11.2 Gateway Earth Stations

The gateway earth stations are expected to employ a 9 meter or larger antenna with a minimum peak transmit gain of 60.5 dBi and a minimum peak receive gain of 59 dBi. The receive system noise temperature is approximately 160 K, resulting in a peak G/T of 37 dB/K. There will be two gateway stations located within CONUS. The locations of the gateway stations have not yet been selected.

B.12 LINK BUDGETS

The INMARSAT 2GHZ network is capable of delivering a wide range of data rates by assigning one of the available FEC rates and associated C/N requirements, depending on available satellite EIRP and G/T at a specific location, fading loss, user terminal antenna G/T and elevation angle.

Tables B.12-1 and B.12-2 show representative link budgets for a range of UTs for the forward and return links, respectively. Because the 250 kHz channels can be aggregated to provide higher throughput for an individual user, there is a wide range of possible data rates. Lower and higher data rates will have similar uplink input power densities and downlink EIRP densities.

Tables B.12-3 and B.12-4 provide the telecommand and telemetry link budgets, respectively.

Table B.12-1 – Representative Link Budgets (Forward Link)

Antenna Class[1]		HandHeld	Palm	Pocket	Notebook
Modulation Scheme		QPSK	QPSK	8PSK	16QAM
FEC Rate		0.25	0.50	0.67	0.75
Allocated Bandwidth	(kHz)	500	500	500	500
Data Rate	(kbps)	160	320	640	960
Uplink					
SAS eirp	(dBW)	63.3	60.7	60.3	60.2
Path Loss	(dB)	207.4	207.4	207.4	207.4
Satellite G/T	(dB/K)	-4.0	-4.0	-4.0	-4.0
Boltzmann Constant	(dBW/K.Hz)	-228.6	-228.6	-228.6	-228.6
Uplink C/N0	(dB/Hz)	80.5	77.9	77.5	77.4
Link Margin	(dB)	4.0	4.0	4.0	4.0
Downlink					
Satellite eirp	(dBW)	51.0	48.3	47.9	47.7
Path Loss	(dB)	191.1	191.1	191.1	191.1
UT G/T	(dB/K)	-28.0	-23.0	-17.0	-12.0
Boltzmann Constant	(dBW/K.Hz)	-228.6	-228.6	-228.6	-228.6
Down C/N0	(dB/Hz)	60.5	62.8	68.4	73.2
Link Margin	(dB)	6.0	4.5	3.5	2.5
Other					
IM C/N0	(dB/Hz)	77.9	75.2	74.8	74.6
Other Beams C/N0	(dB/Hz)	79.9	77.2	76.8	76.6
Other Systems C/N0 Up	(dB/Hz)	86.6	83.9	83.5	83.4
Other Systems C/N0 Down	(dB/Hz)	66.5	68.9	74.4	79.3
Total					
C/N0	(dB/Hz)	54.1	57.7	63.3	66.9
Tx Rate	(kbps)	184.0	368.0	736.0	1104.0
Eb/N0	(dB)	1.5	2.1	4.6	6.5

[1] Also includes similarly-sized vehicular antennas.

Table B.12-2 – Representative Link Budgets (Return Link)

Antenna Class[2]		HandHeld	Palm	Pocket	Notebook
Modulation Scheme		QPSK	QPSK	QPSK	8QAM
FEC Rate		0.25	0.50	0.75	0.75
Allocated Bandwidth	(kHz)	62.5	125	250	500
Data Rate	(kbps)	20	80	240	720
Uplink					
Terminal eirp	(dBW)	-3.9	1.3	6.4	12.6
RF Power	(dBW)	2.1	2.3	1.4	1.8
Path Loss	(dB)	190.3	190.3	190.3	190.3
Satellite G/T	(dB/K)	18.0	18.0	18.0	18.0
Boltzmann Constant	(dBW/K.Hz)	-228.6	-228.6	-228.6	-228.6
Uplink C/N0	(dB/Hz)	52.4	57.6	62.7	68.9
Link Margin	(dB)	6.0	4.5	3.5	2.5
Downlink					
Satellite eirp	(dBW)	-3.2	3.5	9.6	16.8
Path Loss	(dB)	205.9	205.9	205.9	205.9
SAP G/T	(dB/K)	37.0	37.0	37.0	37.0
Boltzmann Constant	(dBW/K.Hz)	-228.6	-228.6	-228.6	-228.6
Down C/N0	(dB/Hz)	56.5	63.2	69.3	76.5
Link Margin	(dB)	4.0	4.0	4.0	4.0
Other					
IM C/N0	(dB/Hz)	68.2	74.9	81.1	88.2
Other Beams C/N0	(dB/Hz)	72.2	73.6	74.4	76.7
Other Systems C/N0 Up	(dB/Hz)	58.4	63.6	68.8	74.9
Other Systems C/N0 Down	(dB/Hz)	62.6	69.2	75.4	82.6
Total					
C/N0	(dB/Hz)	45.1	51.7	57.7	64.6
Tx Rate	(kbps)	23.0	92.0	276.0	828.0
Eb/N0	(dB)	1.5	2.1	3.3	5.4

[2] Also includes similarly-sized vehicular antennas.

Table B.12-3 – Telecommand Link Budgets

Parameter	Units	On-Station Normal (Large Beam)	On-Station Emergency (Omni)
Slant range	km	38600	38600
Frequency	MHz	13998	13998
Power to Antenna	dBW	7.5	22.5
Tx Antenna Gain	dBi	60.5	60.5
Ground Station EIRP	dBW	68.0	83.0
Spreading loss	dB/m^2	-162.7	-162.7
Atmospheric losses	dB	-0.2	-0.2
Received PFD	dBW/m^2	-94.9	-79.9
Aperture Factor	dB(m^2)	-44.4	-44.4
Antenna Gain (-2 dB contour)	dBi	25.0	-2.0
On board losses	dBi	-9.9	-9.9
Power at Rx input	dBW	-124.2	-136.2
Rx Threshold	dBW	-142.0	-142.0
Margin	dB	17.8	5.8

Table B.12-4 – Telemetry Link Budgets

Parameter	Units	On-Station Normal (Large Beam)	On-Station Emergency (Omni)
Slant range	km	38600	38600
Frequency	MHz	11698	11698
Input Power	dBW	-4.0	15.0
Line Losses	dB	-3.0	-3.0
Antenna Gain (-2 dB contour)	dBi	25.0	-2.0
Satellite EIRP	dBW	18.0	10.0
Path loss	dB	-205.6	-205.6
Atmospheric losses	dB	-0.2	-0.2
G/T	dB/K	37.0	37.0
Modulation Loss	dB	-3.5	-3.5
Implementation Loss	dB	-1.2	-1.2
C/N	dB	21.3	13.3
C/N Required	dB	11.0	11.0
Margin	dB	10.3	2.3
PFD at beam peak	dBW/m^2/4 kHz	-158.2	-165.8

B.13 STATION-KEEPING AND ANTENNA POINTING ACCURACY

The INMARSAT 2GHZ satellite will be maintained in longitude within ±0.05° of its nominal orbital location. The INMARSAT 2GHZ satellite will be launched on a 3 degrees inclined geo-synchronous orbit, especially chosen so that natural orbital disturbance effects will gradually bring that inclination down to 0 degrees. Those same effects will then begin to increase the inclination again, and the satellite will be controlled so that it does not exceed 3 degrees inclination. This strategy has traditionally been used by Inmarsat, allowing a significant reduction in the satellite propellant needs for North-South station keeping purposes, thereby extending the satellite's operational life with negligible impact on the system performance. The satellite will be operated in a manner consistent with the Commission's requirements for inclined orbit satellite operations, as specified in §25.280 of the Commission's rules.

As the satellite orbit changes, the satellite's attitude control system will continuously adjust the antenna boresight pointing and the network gateways will periodically update payload antenna beam coefficients, to automatically adjust the satellite's antenna patterns in order to optimally position the footprints over the desired service areas.

B.14 POWER FLUX DENSITY AT THE EARTH'S SURFACE

In the extended Ku-band there are Power Flux Density (PFD) limits in §25.208(b), as follows:

- -150 dB(W/m^2) in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;
- -150+(δ-5)/2 dB(W/m^2) in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane; and
- -140 dB(W/m^2) in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

Compliance with these limits is demonstrated below for both the communications carriers and telemetry carriers.

An analysis was performed in order to verify that the communication carriers do not exceed the PFD limits. From Table B.12-2, the carrier with the highest downlink EIRP density is associated with the Notebook link budget. In the link budgets, the gateway earth station was assumed to be at the -3 dB contour, hence the peak downlink EIRP levels will be 3 dB higher than shown. Table B.14-1 shows the results of an analysis that determined the highest PFD that occurs anywhere along the 0°, 5°, 10°, 15°, 20° and 25° angles of arrival as well as at the beam's peak. From the table, it can be seen that there are significant margins at all angles of arrival; therefore compliance with the PFD limits of §25.208(b) is assured.

Table B.14-1 – Worst Case Communication Carrier PFD Levels

Angle of Arrival	Applicable PFD Limit for Angle of Arrival ($dBW/m^2/4$ kHz)	Worst Case PFD Level at Angle of Arrival ($dBW/m^2/4$ kHz)	PFD Margin (dB)
0°	-150	-165.9	15.9
5°	-150	-165.7	15.7
10°	-147.5	-165.5	18.0
15°	-145	-165.2	20.2
20°	-142.5	-164.9	22.4
25°	-140	-164.6	24.6
Peak (43°)	-140	-163.3	23.3

A similar PFD analysis was performed for the telemetry carriers. The normal mode of operation results in higher PFD levels than the emergency mode. Table B.14-2 shows the results of the PFD analysis. From the table, it can be seen that there are significant margins at all angles of arrival; therefore compliance with the PFD limits of §25.208(b) is again assured.

Table B.14-2 – Worst Case Telemetry PFD Levels

Angle of Arrival	Applicable PFD Limit for Angle of Arrival ($dBW/m^2/4$ kHz)	Worst Case PFD Level at Angle of Arrival ($dBW/m^2/4$ kHz)	PFD Margin (dB)
0°	-150	-160.8	10.8
5°	-150	-160.7	10.7
10°	-147.5	-160.4	12.9
15°	-145	-160.1	15.1
20°	-142.5	-159.8	17.3
25°	-140	-159.5	19.5
Peak (43°)	-140	-158.2	18.2

No INMARSAT 2GHZ emissions in the 11.5-11.7 GHz band will exceed the PFD limits of §25.208(b).

B.15 CESSATION OF EMISSIONS

All communications link transmissions from the satellite can be turned on and off by ground telecommand, thereby causing cessation of emissions from the satellite, as required.

B.16 TT&C

The telemetry, tracking, and command subsystem provides the satellite communications links for pre-launch, orbit-raising, and on-station operations. The TT&C system receives commands from the satellite mission control operations center, authenticates the commands, and distributes the commands to the appropriate satellite control units. The TT&C system also transmits satellite telemetry and receives and transmits ranging signals to the mission control operations center.

The TT&C signals use 13998 MHz for commanding and 11698 MHz for telemetry. In normal mode operation, the signals are received / transmitted via the large Ku-band beam in both linear polarizations. The TT&C sites will be located at the gateway stations.

B.17 SPACECRAFT CHARACTERISTICS

The spacecraft manufacturer for the INMARSAT 2GHZ satellite has not yet been selected. Inmarsat will provide the Commission with full spacecraft physical and electrical characteristics when the manufacturer has been selected. Estimates of these characteristics are included in the Schedule S form.

Payload reliability will be 0.74 and bus reliability will be 0.89 with an overall spacecraft reliability of approximately 0.66. Amplifier and receiver sparing is consistent with documented failure rates that allow the attainment of the overall spacecraft reliability numbers stated.

B.18 COMMUNICATIONS PAYLOAD

The communications payload includes all the necessary antennas and transponder hardware to receive, amplify, configure and transmit signals among user terminals and satellite access stations. The forward link provides communications between the gateway earth stations and the user terminals using the extended Ku-band on the uplink and S-Band on the downlink. The return link provides communications between the user terminals and the gateway earth stations using S-Band on the uplink and the extended Ku-band on the downlink. Digital beam forming enables up to 180 S-Band beams to be created.

The Forward link receives signals at Ku-Band and transmits at S-Band. The signals are received by the dual polarized large beam antenna in either HP or VP before being amplified in the Ku-Band LNA. Each polarization is connected to the Ku-Band downconverter where the receive bandwidth is divided into sub-bands prior to connecting to the DSP. The DSP performs channel mapping and beam forming functions on a channel-by-channel case. The DSP is followed by the S-Band Post-processor where the signals are filtered and up converted to S-Band. To achieve the required output power, the Post-processor outputs are connected to Modular Power Amplifiers, each comprising an INET, input switch network, SSPA's, output switch network and an ONET. The outputs of the MPA's are connected to the feed elements, which form the mobile antenna feed array to transmit the signals via the antenna paraboloid reflector. The different beams are produced by selected groups of feed elements illuminating the reflector as defined by the beam weights of the DSP.

The Return link receives signals at S-Band and transmits at Ku-Band. The mobile receive antenna operates in exactly the same way as the transmit antenna. The receive beams share a common reflector and feed elements with the transmit beams. Each element is connected to an LNA where the signals are amplified before connecting to the S-Band Pre-processor. The Pre-processor provides conversion of mobile receive signals to base band for processing within the DSP; this includes beam forming multiplexing and channelization. The DSP is followed by the Ku-Band Upconverter. The signals are up-converted and filtered within the Ku-Band Upconverter before being amplified by the Ku-Band amplifiers. The Ku-band amplifiers are followed by output filters; one on each polarization.

B.19 TWO-DEGREE COMPATIBILITY ANALYSIS

Telesat Canada operates the ANIK F2 satellite at 111.1° W.L. The satellite does not use the extended Ku-bands except for telecommand carriers centered at 13.996 GHz and in both polarizations. The bandwidth of the telecommand carriers is 1.3 MHz.[3] The frequency plan of the INMARSAT 2GHZ satellite was specifically chosen to avoid the ANIK F2 telecommand carriers such that there is no frequency overlap between the two satellites. There are no other operating or authorized satellites using the extended Ku-bands within two degrees.

In order to show two-degree compatibility, the Ku-band transmission parameters of the INMARSAT 2GHZ satellite have been assumed as both the wanted and victim transmissions. Table B.19-1 provides a summary of the Ku-band feeder link and TT&C transmission parameters.

Table B.19-1. Summary of the Ku-band feeder link and TT&C transmission parameters.

Carrier ID	Occupied BW (kHz)	Tx Antenna Gain (dBi)	Rx Antenna Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	C/I Criterion (dB)	Comments
Handheld	460	60.5		63.3		30.0	
Palm	460	60.5		60.7		27.3	
Pocket	460	60.5		60.3		26.9	
Notebook	460	60.5		60.2		26.8	
Telecommand	900	60.5		68.0		23.2	Normal operation assumed.
Handheld	57.5		59.0		-3.2	21.1	
Palm	115		59.0		3.5	24.8	
Pocket	230		59.0		9.6	27.9	
Notebook	460		59.0		16.8	32.1	
Telemetry	150		59.0		18	23.2	

The C/I criteria stated in the Schedule S form apply to the feeder link portion of the links only.

The interference calculations assumed a 1 dB advantage for topocentric-to-geocentric conversion, all wanted and interfering carriers are co-polarized and all earth station antennas conform to a sidelobe pattern of 29-25 log(θ).

3 *See* SAT-PDR-20010906-00082.

Tables B.19-2 and B.19-3 show the results of the interference calculations in terms of the uplink and downlink C/I margins, respectively. The Tables are provided in a format similar to that of the output of the Sharp Adjacent Satellite Interference Analysis program.

Table B.19-2. Summary of the uplink C/I margins (dB).

		Interfering Carrier				
	Carrier ID	Handheld	Palm	Pocket	Notebook	Telecommand
Wanted Carrier	Handheld	10.1	12.7	13.1	13.2	-3.6
	Palm	10.2	12.8	13.2	13.3	-3.5
	Pocket	10.2	12.8	13.2	13.3	-3.5
	Notebook	10.2	12.8	13.2	13.3	-3.5
	Telecommand	30.6	33.2	33.6	33.7	16.9

Table B.19-3. Summary of the downlink C/I margins (dB).

		Interfering Carrier				
	Carrier ID	Handheld	Palm	Pocket	Notebook	Telemetry
Wanted Carrier	Handheld	17.5	13.8	10.7	6.5	0.4
	Palm	17.5	13.8	10.7	6.5	0.4
	Pocket	17.5	13.8	10.7	6.5	1.5
	Notebook	17.5	13.8	10.7	6.5	4.5
	Telemetry	32.4	28.7	25.6	21.4	15.4

Table B.19-2 shows that positive C/I margins result between all the communications carriers, however the telecommand carriers interfering into the communications carriers produce small negative margins. Because the telecommand carriers are at the edge of the band (13.998 GHz), it is possible that a future adjacent satellite would not have communications transponders overlapping in frequency with the INMARSAT 2GHZ telecommand carriers. In any event, it is expected that coordination can be achieved with any future adjacent satellite operator using the 13.8-14.0 GHz band.

Table B.19-3 shows that the downlink C/I margins are positive in all cases.

Inmarsat, through its notifying administration, will coordinate it operations with all affected administrations following normal ITU coordination procedures.

B.20 SHARING ANALYSIS WITH OTHER SERVICES

The 11.45-11.7 GHz bands are shared on a co-primary basis with the Fixed Service ("FS"). The GSO FSS space station PFD limits of §25.208(b) have been developed for the protection of the FS in these frequency bands. Section B.14 demonstrates that the INMARSAT 2GHZ satellite will not exceed the PFD limits of §25.208(b) and therefore FS stations are adequately protected from interference. Coordination of the gateway earth stations with the FS will be effected, as required.

The 13.75-14.0 GHz band is allocated domestically and internationally to the FSS. §25.204(f) states in part:

> "In the band 13.75–14 GHz, an earth station in the fixed-satellite service shall have a minimum antenna diameter of 4.5 m and the e.i.r.p. of any emission should be at least 68 dBW and should not exceed 85 dBW."

Uplink transmissions using the 13.8-14.0 GHz band will use a 9 m or larger antenna, which satisfies the minimum antenna diameter requirement of §25.204(f). No uplink transmissions exceed an EIRP of 85 dBW, however most are less the 68 dBW. The 68 dBW value specified in §25.204(f) is only a guideline, and the Commission has expressly "remov[ed] the minimum power requirement for FSS operations" that once existed in this band.[4] The minimum uplink EIRP of 68 dBW was developed to protect FSS uplink transmissions from Radiolocation and Radionavigation Services that share the band. Reduced Inmarsat uplink transmissions in no way affect Radiolocation and Radionavigation stations. Inmarsat does not seek to impose constraints on these services arising from to uplink transmission levels that are less than 68 dBW. In addition, the gateway station locations will be selected such that sufficient geographical separation from Radiolocation receivers is provided to ensure the PFD level at any Radiolocation receiver is less than -167 dBW/m^2/4 kHz.

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4 *See Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems, in the Ku-Band Frequency Range*, ET Docket No. 98-206, RM-9147, RM-9245, First Report and Order and Further Notice of Proposed Rulemaking, 16 FCC Rcd 4096, ¶ 144 (2000).

B.21 ORBITAL DEBRIS MITIGATION

Inmarsat will assess and limit the amount of debris released during normal operations. The satellite will be designed such that no debris will be generated after separation from the launch vehicle and during normal on-station operations. The pyrotechnic devices onboard the satellite will be designed to retain all physical debris. Inmarsat will assess and limit the probability of the space station becoming a source of debris by collisions with small debris or meteoroids that could cause loss of control and prevent post-mission disposal. The probability of collisions with small debris and meteoroids are taken into account as part of the satellite design. In addition, all sources of stored energy are located within the body of the spacecraft, thereby providing protection from small orbital debris. Inmarsat uses the services of the USSTRATCOM organization to perform collision avoidance analysis for its satellites during the post-launch phase.

Inmarsat will assess and limit the probability of accidental explosions during and after completion of mission operations. The satellite will be designed to ensure that debris generation will not result from the conversion of energy sources on board the satellite into energy that fragments the satellite. The propulsion subsystem pressure vessels will be designed with high safety margins. All pressures, including those of the batteries, will be monitored by telemetry. At end-of-life and once the satellite has been placed into its final disposal orbit, all on-board sources of stored energy will be depleted or secured, and the batteries will be discharged

Inmarsat has examined whether its station-keeping volume might overlap with that of other operational or planned satellites in the vicinity of the 113° W.L. orbital location. In considering operational and planned satellites that may have a station-keeping volume that overlaps the INMARSAT 2GHZ satellite, Inmarsat has reviewed the lists of FCC licensed systems and systems that are currently under consideration by the FCC. In addition, networks for which a request for coordination has been submitted to the ITU for an orbital location between 112.8° W.L. and 113.2° W.L. have also been reviewed.

Based on our review, EchoStar has Commission authorization to launch and operate the Ka-band ECHOSTAR-113W satellite at 113° W.L. In addition, Satelites Mexicanos, S.A. de C.V.

("SatMex") operates the SOLIDARIDAD-2 satellite at 113° W.L. There are no other systems under consideration to be licensed by the Commission at 113° W.L.

The Administration of Mexico has a number of satellite networks filed with the ITU for the 113° W.L. slot. The Administrations of Australia and the UK have filed the ROEBUCK-B and UKSAT-11 networks, respectively, at 113° W.L. There is also a U.S. V-band network. We can find no evidence that satellite construction contracts have been awarded for the Australian, UK, or U.S. V-band networks, nor does the Federal Aviation Administration Commercial Space Station Third Quarter 2005 Launch Report show a pending launch for any of these networks.

Inmarsat concludes that physical coordination of its INMARSAT 2GHZ satellite with the EchoStar and SatMex satellites will be required. Inmarsat will begin coordination with these operators approximately two years before the expected launch of the INMARSAT 2GHZ satellite.

There are a number of potential flight dynamic solutions to be explored in consultation with SatMex and EchoStar to ensure avoidance of in-orbit collision between the satellites, including the possibility of operating the satellites at small angular offsets from their nominal position. In the event that a coordination agreement requires operation of the satellite at an offset from its assigned nominal position, Inmarsat will seek any necessary modifications to its authorization from the Commission. Inmarsat will similarly seek to coordinate with any new satellites that may be authorized and launched to the 113° W.L. nominal orbital location.

At the end of the operational life of the IMMARSAT 2GHZ satellite, Inmarsat plans to maneuver the satellite to a disposal orbit with a minimum perigee of 375 km above the normal GSO operational orbit. This proposed disposal orbit altitude is based on the following calculation, as required by §25.283:

Estimated Total Solar Pressure Area "A" = 290 m^2

"M" = Dry Mass of Satellite = 4200 kg

"C_R" = Solar Pressure Radiation Coefficient (worst case) = 2.0

Therefore the Minimum Disposal Orbit Perigee Altitude:

$= \quad 36{,}021 \text{ km} + 1000 \times C_R \times A/m$

$= \quad 36{,}021 \text{ km} + 1000 \times 2 \times 290/4200$

$= \quad 36{,}159 \text{ km}$

$= \quad 373 \text{ km above GSO}$

The propulsion subsystem design and the satellite fuel budget account for the post-mission disposal of the satellite. An estimated 18 kg of propellant will be allocated and reserved for the final orbit raising maneuvers.

B.22 COMMENTS CONCERNING SCHEDULE S SUBMISSION

In this section, additional explanation is provided concerning specific areas of the Schedule S form where the advanced design of the INMARSAT 2GHZ satellite design does not necessarily comport well with all the requirements of the Schedule S form. To the extent that the Commission considers any of these areas to be in non-compliance with the Schedule S requirements, Inmarsat requests a waiver, based on the justification and explanation given below.

1. S7 and S8 ("Antenna Beam" and "Beam Diagram" tabs in Schedule S):

   (i) Only one representative uplink and downlink S-band spot beam (SU and SD beams) has been included in the Schedule S form. Should the Commission require it, Inmarsat will provide additional gain contour files for other beam positions over the U.S.

   (ii) Item S7m: Transmit Max EIRP (dBW) for the SD beam. The value entered here is 80 dBW, which is the aggregate EIRP value available for all spot beams. In practice, the available power will be distributed across a number of spot beams.

   (iii) Item S7p: It is not meaningful to specify the Minimum Saturation Flux Density of the channels of the INMARSAT 2GHz satellite because the amplifiers will never be operated at or close to saturation. Instead they will only be operated in a linear, backed-off mode. In this case the transponder linear gain parameters are more relevant, and these have been provided in Section B.7 above.

2. S10 (“Space Station Transponders” tab in Schedule S):

   The satellite does not have conventional transponders. There is no fixed frequency relationship between the S-band frequencies and the extended Ku-band feeder link frequencies. For purposes of completing the Schedule S form, the connectivity between the feeder link Ku-band spectrum, in both the forward and return directions, have been described as showing all available feeder link spectrum strapped to the available S-band spectrum.

3. S14 (“Other” tab in Schedule S): The address, telephone number and call signs of the TT&C earth stations are not yet available, but will be provided to the Commission in due course.

CERTIFICATION OF PERSON RESPONSIBLE FOR PREPARING ENGINEERING INFORMATION

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in this Petition for Declaratory Ruling, that I am familiar with Part 25 of the Commission's rules, that I have either prepared or reviewed the engineering information submitted in this Petition for Declaratory Ruling, and that it is complete and accurate to the best of my knowledge and belief.

/s/

Marcus Vilaça
Chief Scientist
Inmarsat Ventures Limited

September 26, 2005

APPENDIX C

ITU FILING

19 May 2005

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Fax: 00 41 22 730 5785

Dear Sir

Subject – Advanced Publication Information for the Inmarsat S-band Satellite Networks

The Administration of the United Kingdom hereby submits to the Radiocommunication Bureau the enclosed advanced publication information for the Inmarsat S-band satellite networks: Inmarsat-S1, Inmarsat-S2, Inmarsat-S3, Inmarsat-S4, Inmarsat-S5, Inmarsat-S6, Inmarsat-S7, Inmarsat-S8, Inmarsat-S9 and Inmarsat-S10.

It would be appreciated if you could confirm receipt of this communication via email to ifc.enquiries@ofcom.org.uk.

Yours sincerely

Stephen Limb BSc(Eng) MPhil MIEE CEng

cc. Jonas Eneberg, Inmarsat

UNION INTERNATIONALE DES TELECOMMUNICATIONS
BUREAU DES RADIOCOMMUNICATIONS

INTERNATIONAL TELECOMMUNICATION UNION
RADIOCOMMUNICATION BUREAU

UNIÓN INTERNACIONAL DE TELECOMUNICACIONES
OFICINA DE RADIOCOMUNICACIONES

RESEAU(X) A SATELLITE SATELLITE NETWORK RED(ES) DE SATÉLITE	INMARSAT-S7	SECTION SPECIALE N° SPECIAL SECTION No. SECCIÓN ESPECIAL N.°	API/A/3662
---	---	IFIC / DATE IFIC / DATE IFIC / FECHA	2549 / 26.07.2005
ADM. RESPONSABLE RESPONSIBLE ADM. ADM. RESPONSABLE G	LONGITUDE NOMINALE NOMINAL LONGITUDE LONGITUD NOMINAL 110 W	NUMERO D'IDENTIFICATION IDENTIFICATION NUMBER NUMERO DE IDENTIFICACION	105540327
RENSEIGNEMENTS REÇUS PAR LE BUREAU LE / INFORMATION RECEIVED BY THE BUREAU ON / INFORMACIÓN RECIBIDA POR LA OFICINA EL			19.05.2005

Ces renseignements sont publiés par le Bureau des radiocommunications en application du No. 9.2B. Ils font l'objet de la (les) procédure(s) suivante(s), indiquée(s) ci-dessous par un X dans la case pertinente.

This information is published by the Radiocommunication Bureau in accordance with No. 9.2B. It is subject to the procedure(s) indicated below by an X in the relevant box.

Esta información se publica por la Oficina de Radiocomunicaciones en virtud del No. 9.2B. Está sujeta al (a los) procedimiento(s) siguiente(s), señalado(s) con una X en la casilla apropriada.

[ ] Les renseignements ont été reçus conformément à **l'Article 9, sous-section IA**

Toute administration estimant que des brouillages inacceptables peuvent être causés à ses réseaux ou à ses systèmes à satellites existants ou en projet devra communiquer ses commentaires à l'administration qui a demandé la publication, avec copie au Bureau des radiocommunications, dans le delai de quatre mois qui suit la date de la présente publication.

The information has been received pursuant to **Article 9, Sub-Section IA**

Any administration which believes that unacceptable interference may be caused to its existing or planned satellite networks or systems shall communicate its comments to the publishing administration, with a copy to the Radiocommunication Bureau, within four months after the date of this publication.

La información ha sido recibida de conformidad con **el artículo 9, sub-sección IA**

Toda administración que estime que pueden causarse interferencias inaceptables a sus redes o sistemas de satélites existentes o previstos communicará sus commentarios a la administración que haya publicado la información, con copia a la Oficina de Radiocomunicaciones, en un plazo de cuatro meses contados a partir de la fecha de esta publicación.

DATE LIMITE POUR LA RECEPTION DES COMMENTAIRES
EXPIRY DATE FOR THE RECEIPT OF COMMENTS
FECHA LÍMITE PARA LA RECEPTIÓN DE LOS COMENTARIOS

[X] Les renseignements ont été reçus conformément à **l'Article 9, sous-section IB**

Toute administration estimant que ses réseaux à satellite, ses systèmes à satellites ou ses stations de terre, selon le cas, existants ou en projet, sont affectés, peut envoyer ses observations à l'administration qui a demandé la publication des renseignements, avec copie au Bureau des radiocommunications.

The information has been received pursuant to **Article 9, Sub-Section IB**

Any administration which considers that its existing or planned satellite systems or networks or terrestrial stations, as appropriate, are affected, may send its comments to the administration which has requested publication of the information, with a copy of such comments to the Radiocommunication Bureau.

La información ha sido recibida de conformidad con **el artículo 9, sub-sección IB**

Cualquier administración que considere que sus sistemas o redes des satélites o estaciones terrenales, según el caso, existentes o planificados se verán afectados, podrá comunicar sus comentarios a la administración que haya solicitado la publicación de la información, enviando una copia de dichos comentarios a la Oficina de Radiocommunicaciones.

Information aussi disponible sur le / Information also available on the / Información también disponible en: Space Network Systems Online Service : http://www-br/sns/advpub.html

Items	Description	Description	Descripción
A1a	Identité du réseau à satellite	Identity of the satellite network	Identidad de la red de satélite
A1f1	Administration notificatrice (voir le Tableau 1 de la Préface)	Notifying administration (Refer to Table 1 of the Preface)	Administración notificante (véase el cuadro 1 del Prefacio)
A1f3	Organisation Intergouvernementale de Satellite	Intergovernmental Satellite Organization	Organización Intergubernamental de Satélite
A2a	Date de mise en service	Date of bringing into use	Fecha de puesta en servicio
A2b	Période de validité (année)	Period of validity (year)	Periodo de validez (año)
A4a1	Longitude nominale d'une station spatiale géostationnaire (degré)	Nominal longitude of a geostationary space station (degree)	Longitud nominal de una estación espacial geoestacionaria (grado)
A4b2	Corps de référence	Reference body	Cuerpo de referencia
A13	Référence aux Sections Spéciales	Reference to Special Sections	Referencia a las Secciones Especiales
C1a	Limite inférieure de la gamme de fréquences	Lower limit of the frequency range	Frecuencia más baja de la gama de frecuencias
C1b	Limite supérieure de la gamme de fréquences	Upper limit of the frequency range	Frecuencia más alta de la gama de frecuencias
C2c	Si l'assignation de fréquence doit être notifiée au titre du numéro 4.4, une indication à cet effet	If the frequency assignment is to be filed under No. 4.4, an indication to that effect	Si la asignación de frecuencia debe notificarse con arreglo al número 4.4, indicación a tal efecto
C4a	Classe de station (voir le Tableau 3 de la Préface)	Class of station (Refer to Table 3 of the Preface)	Clase de estación (véase el cuadro 3 del Prefacio)
C4b	Nature du service (voir le Tableau 4 de la Préface)	Nature of service (Refer to Table 4 of the Preface)	Naturaleza del servicio (véase el cuadro 4 del Prefacio)
C11a2	Symbole de la zone de service	Service area symbol	Símbolo de la zona de servicio
C11a3	Diagramme de zone de service annexe	Service area diagram attachment	Diagrama de la zona de servicio anexo
C11a4	Description détaillée de la zone de service	Narrative description of the service area	Descripción detallada de la zona de servicio
BR1	Date de réception	Date of receipt	Fecha de recepción
BR3a	Code de référence de la disposition	Provision reference code	Código de referencia de la disposición
BR6a	Numéro d'identification du réseau à satellite	Identification number of the network	Número de identificación de la red
BR6b	Ancien numéro d'identification du réseau à satellite	Old identification number of the network	Número anterior de la identificación de la red
BR7a	Numéro d'identification du groupe	Identification number of the group	Número de la identificación del grupo
BR7b	Ancien numéro d'identification du groupe	Old identification number of the group	Número anterior de la identificación del grupo
BR9	Code indiquant l'action effectuée sur l'entité (groupe)	Code indicating the action to be taken on the entity (group)	Código que indica la acción efectuada en la entidad (grupo)
BR14	Symbole et numéro de la Section Spéciale	Symbol and number of the Special Section	Símbolo y número de la Sección Especial
BR20	Numéro de la IFIC	IFIC number	Número de la IFIC
BR22	Remarques de l'Administration	Administration remarks	Observaciones de la Administración
BR23	Observations du Bureau des radiocommunications	Radiocommunication Bureau comments	Comentarios de la Oficina de Radiocomunicaciones

SECTION SPECIALE / SPECIAL SECTION / SECCION ESPECIAL

A *A1a* Sat. Network INMARSAT-S7 *A1f1* Notifying adm. G *A1f3* Inter. sat. org. *BR1* Date of receipt 19.05.2005 *BR20* IFIC no. 2549

BR6a/BR6b Id. no. 105540327 *BR3a* Provision reference 9.1/IB

A4a1 Orbital long. 110 W

BR7a/BR7b Group id. 105611930 *BR1* Date of receipt 5/19/2005 *C2c* RR No. 4.4

BR14 Special Section API/A/3662 IFIC/2549

A2a Date of bringing into use 12.05.2012 *A2b* Period of valid. 25

C1 Frequency Range			
C1a Lower limit		*C1b* Upper limit	
5725	MHz	5850	MHz

C4a Class of station EC ED EK

C4b Nature of service CP CV CV

C11a2 Service area *C11a3* Service area diagram

C11a4 Service area name XR1

BR7a/BR7b Group id. 105611931 *BR1* Date of receipt 5/19/2005 *C2c* RR No. 4.4

BR14 Special Section API/A/3662 IFIC/2549

A2a Date of bringing into use 12.05.2012 *A2b* Period of valid. 25

C1 Frequency Range			
C1a Lower limit		*C1b* Upper limit	
5850	MHz	6725	MHz

C4a Class of station EC ED EK

C4b Nature of service CP CV CV

C11a2 Service area *C11a3* Service area diagram

C11a4 Service area name GLOBAL

BR7a/BR7b Group id. 105611932 *BR1* Date of receipt 5/19/2005 *C2c* RR No. 4.4

BR14 Special Section API/A/3662 IFIC/2549

A2a Date of bringing into use 12.05.2012 *A2b* Period of valid. 25

C1 Frequency Range			
C1a Lower limit		*C1b* Upper limit	
3400	MHz	4200	MHz

C4a Class of station EC ER EK

C4b Nature of service CP CV CV

C11a2 Service area *C11a3* Service area diagram

C11a4 Service area name GLOBAL

SECTION SPECIALE / SPECIAL SECTION / SECCION ESPECIAL API/A/3662

A *A1a* Sat. Network INMARSAT-S7 *A1f1* Notifying adm. G *A1f3* Inter. sat. org. *BR1* Date of receipt 19.05.2005 *BR20* IFIC no. 2549

BR6a/BR6b Id. no. 105540327 *BR3a* Provision reference 9.1/IB

BR7a/BR7b Group id. 105611933 *BR1* Date of receipt 5/19/2005 *C2c* RR No. 4.4

BR14 Special Section API/A/3662 IFIC/2549

A2a Date of bringing into use 12.05.2012 *A2b* Period of valid. 25

C1 Frequency Range			
C1a Lower limit		*C1b* Upper limit	
13.75	GHz	14.5	GHz

C4a Class of station EC ED EK

C4b Nature of service CP CV CV

C11a2 Service area *C11a3* Service area diagram

C11a4 Service area name GLOBAL

BR7a/BR7b Group id. 105611934 *BR1* Date of receipt 5/19/2005 *C2c* RR No. 4.4

BR14 Special Section API/A/3662 IFIC/2549

A2a Date of bringing into use 12.05.2012 *A2b* Period of valid. 25

C1 Frequency Range			
C1a Lower limit		*C1b* Upper limit	
10.95	GHz	11.2	GHz

C4a Class of station EC ER EK

C4b Nature of service CP CV CV

C11a2 Service area *C11a3* Service area diagram

C11a4 Service area name GLOBAL

BR7a/BR7b Group id. 105611935 *BR1* Date of receipt 5/19/2005 *C2c* RR No. 4.4

BR14 Special Section API/A/3662 IFIC/2549

A2a Date of bringing into use 12.05.2012 *A2b* Period of valid. 25

C1 Frequency Range			
C1a Lower limit		*C1b* Upper limit	
11.45	GHz	11.7	GHz

C4a Class of station EC ER EK

C4b Nature of service CP CV CV

C11a2 Service area *C11a3* Service area diagram

C11a4 Service area name GLOBAL

BR7a/BR7b Group id. 105611936 *BR1* Date of receipt 5/19/2005 *C2c* RR No. 4.4

BR14 Special Section API/A/3662 IFIC/2549

A *A1a* Sat. Network INMARSAT-S7 *A1f1* Notifying adm. G *A1f3* Inter. sat. org. *BR1* Date of receipt 19.05.2005 *BR20* IFIC no. 2549

BR6a/BR6b Id. no. 105540327 *BR3a* Provision reference 9.1/IB

A2a Date of bringing into use 12.05.2012 *A2b* Period of valid. 25

C1 Frequency Range			
C1a Lower limit		*C1b* Upper limit	
27.5	GHz	31	GHz

C4a Class of station EC ED EK

C4b Nature of service CP CV CV

C11a2 Service area *C11a3* Service area diagram

C11a4 Service area name GLOBAL

BR7a/BR7b Group id. 105611937 *BR1* Date of receipt 5/19/2005 *C2c* RR No. 4.4

BR14 Special Section API/A/3662 IFIC/2549

A2a Date of bringing into use 12.05.2012 *A2b* Period of valid. 25

C1 Frequency Range			
C1a Lower limit		*C1b* Upper limit	
18.4	GHz	21.2	GHz

C4a Class of station EC ER EK

C4b Nature of service CP CV CV

C11a2 Service area *C11a3* Service area diagram

C11a4 Service area name GLOBAL

BR7a/BR7b Group id. 105611938 *BR1* Date of receipt 5/19/2005 *C2c* RR No. 4.4

BR14 Special Section API/A/3662 IFIC/2549

A2a Date of bringing into use 12.05.2012 *A2b* Period of valid. 25

C1 Frequency Range			
C1a Lower limit		*C1b* Upper limit	
2160	MHz	2170	MHz

C4a Class of station EI

C4b Nature of service CP

C11a2 Service area *C11a3* Service area diagram

C11a4 Service area name XR2

BR7a/BR7b Group id. 105611939 *BR1* Date of receipt 5/19/2005 *C2c* RR No. 4.4

BR14 Special Section API/A/3662 IFIC/2549

A *A1a* Sat. Network INMARSAT-S7 *A1f1* Notifying adm. G *A1f3* Inter. sat. org. *BR1* Date of receipt 19.05.2005 *BR20* IFIC no. 2549

BR6a/BR6b Id. no. 105540327 *BR3a* Provision reference 9.1/IB

A2a Date of bringing into use 12.05.2012 *A2b* Period of valid. 25

C1 Frequency Range			
C1a Lower limit		*C1b* Upper limit	
2170	MHz	2200	MHz

C4a Class of station EI
C4b Nature of service CP
C11a2 Service area *C11a3* Service area diagram
C11a4 Service area name GLOBAL

BR7a/BR7b Group id. 105611940 *BR1* Date of receipt 5/19/2005 *C2c* RR No. 4.4
BR14 Special Section API/A/3662 IFIC/2549
A2a Date of bringing into use 12.05.2012 *A2b* Period of valid. 25

C1 Frequency Range			
C1a Lower limit		*C1b* Upper limit	
2010	MHz	2025	MHz

C4a Class of station EI
C4b Nature of service CP
C11a2 Service area *C11a3* Service area diagram
C11a4 Service area name XR2

BR7a/BR7b Group id. 105611941 *BR1* Date of receipt 5/19/2005 *C2c* RR No. 4.4
BR14 Special Section API/A/3662 IFIC/2549
A2a Date of bringing into use 12.05.2012 *A2b* Period of valid. 25

C1 Frequency Range			
C1a Lower limit		*C1b* Upper limit	
1980	MHz	2010	MHz

C4a Class of station EI
C4b Nature of service CP
C11a2 Service area *C11a3* Service area diagram
C11a4 Service area name GLOBAL

BR7a/BR7b Group id. 105611942 *BR1* Date of receipt 5/19/2005 *C2c* RR No. 4.4
BR14 Special Section API/A/3662 IFIC/2549

SECTION SPECIALE / SPECIAL SECTION / SECCION ESPECIAL — API/A/3662

A *A1a* Sat. Network INMARSAT-S7 *A1f1* Notifying adm. G *A1f3* Inter. sat. org. *BR1* Date of receipt 19.05.2005 *BR20* IFIC no. 2549

BR6a/BR6b Id. no. 105540327 *BR3a* Provision reference 9.1/IB

A2a Date of bringing into use 12.05.2012 *A2b* Period of valid. 25

C1 Frequency Range			
C1a Lower limit		*C1b* Upper limit	
12.5	GHz	12.7	GHz

C4a Class of station: EC | ER | EK

C4b Nature of service: CP | CV | CV

C11a2 Service area

C11a3 Service area diagram

C11a4 Service area name XR1 & XR3

BR7a/BR7b Group id. 105611943 *BR1* Date of receipt 5/19/2005 *C2c* RR No. 4.4

BR14 Special Section API/A/3662 IFIC/2549

A2a Date of bringing into use 12.05.2012 *A2b* Period of valid. 25

C1 Frequency Range			
C1a Lower limit		*C1b* Upper limit	
12.7	GHz	12.75	GHz

C4a Class of station: EC | ER | EK

C4b Nature of service: CP | CV | CV

C11a2 Service area

C11a3 Service area diagram

C11a4 Service area name GLOBAL

BR22 Administration remarks

BR23 Radiocommunication Bureau comments

APPENDIX D

TECHNICAL RULE CROSS REFERENCE

APPENDIX D

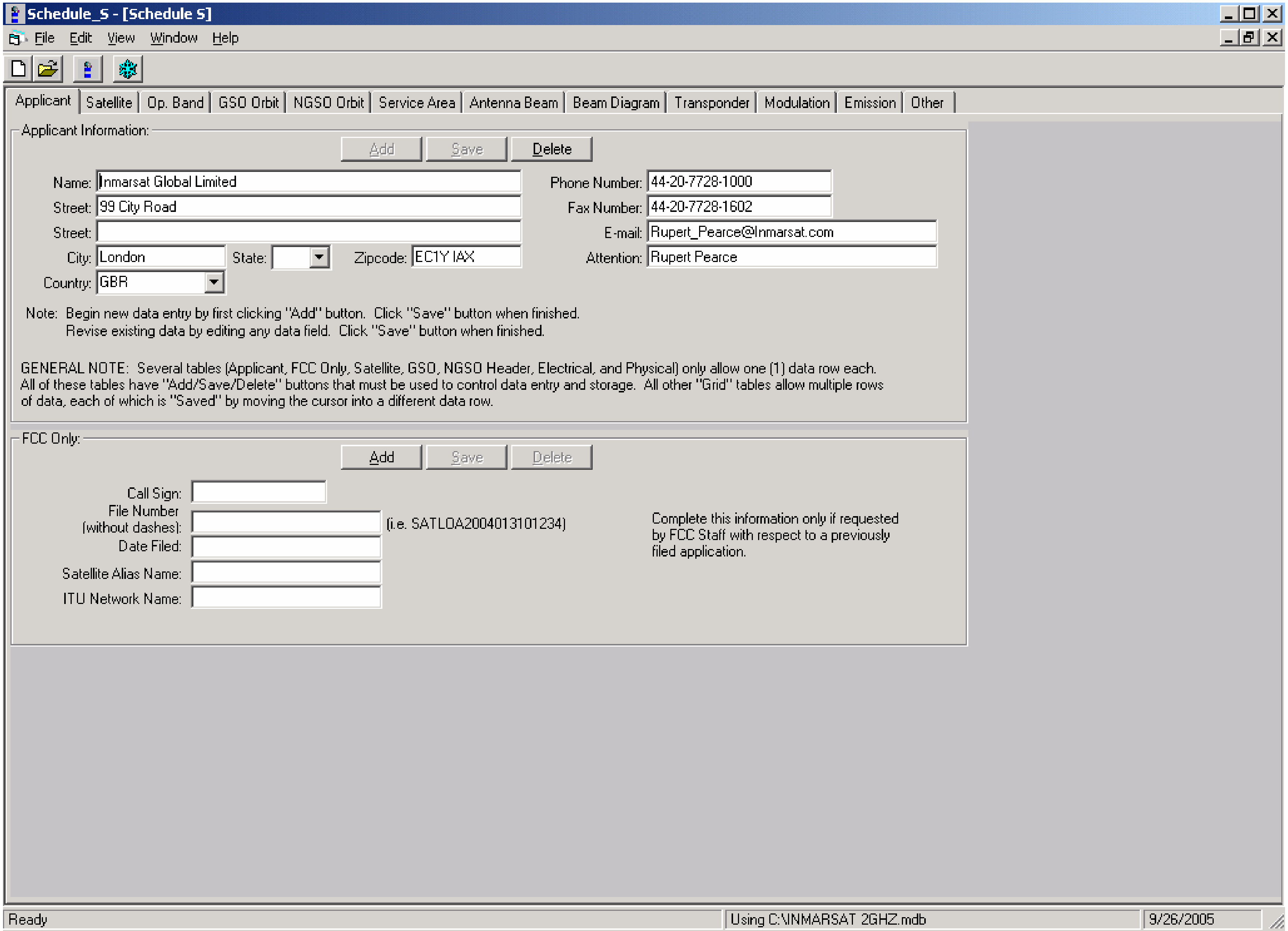
Technical Rule Cross Reference

Rule	Sub-part	Information Requested	Technical Appendix Reference	Schedule S Reference
25.114 (c)	(4)(i)	Radio frequencies and polarization plan, center frequency and polarization of transponders.	B.4	S2, S9
25.114 (c)	(4)(ii)	Emission designators and allocated bandwidth of emission.	B.10	S11.b, S11.c
25.114 (c)	(4)(i)	Final amplifier output power, net losses between output of final amplifier and input of antenna and maximum EIRP for each antenna beam.	B.5.1, B.5.2	S7
25.114 (c)	(4)(iii)	Identification of which antenna beams are connected or switchable to each transponder and TT&C function.	B.4	S10
25.114 (c)	(4)(iv)	Receiving system noise temperature.	B.6.1, B.6.2	S7
25.114 (c)	(4)(v)	The relationship between satellite receive antenna gain pattern and gain-to-temperature ratio and saturation flux density for each antenna beam.	B.6.1, B.6.2, B.7	S7
25.114 (c)	(4)(vi)	The gain of each transponder channel including any adjustable gain step capabilities.	B.7	S7
25.114 (c)	(4)(vii)	Predicted receiver and transmitter channel filter response characteristics.	B.8	
25.114 (c)	(5)(i)	Orbital location.	B.2	S3
25.114 (c)	(5)(ii)	The factors that support the orbital assignment proposed.	B.2	S3
25.114 (c)	(5)(iii)	Longitudinal tolerance or east-west station-keeping capability.	B.13	S3
25.114 (c)	(5)(iv)	Inclination incursion or north-south station-keeping capability.	B.13	S3
25.114 (c)	(7)	The accuracy with which the orbital inclination, the antenna axis attitude, and longitudinal drift will be maintained.	B.13	S3, S7
25.114 (c)	(8)	Calculation of power flux density levels within each coverage area and of the energy dispersal, if any, needed for compliance with §25.208, for angles of arrival of 5°, 10°, 15°, 20°, and 25° above the horizontal.	B.14	S8
25.114 (c)	(9)	Arrangement for tracking, telemetry, and control.	B.16	
25.114 (c)	(10)	Physical characteristics of the space station including weight and dimensions of spacecraft, detailed mass and power budgets, and estimated operational lifetime and reliability of the space station and the basis for that estimate.	B.17	S1, S15, S16
25.114 (c)	(11)	A clear and detailed statement of whether the space station is to be operated on a common tamer basis, or whether non-common carrier transactions are proposed.		Sl
25.114 (c)	(12)	Dates by which construction will be commenced and completed, launch date, and estimated date		S1

Rule	Sub-part	Information Requested	Technical Appendix Reference	Schedule S Reference
		of placement into service.		
25.114 (d)	(1)	General description of overall system facilities, operations and services.	B.1	
25.114 (d)	(2)	The feeder link frequencies requested for the satellite.	B.1, B.4	S2
25.114 (d)	(3)	Predicted space station antenna gain contours for each transmit and each receive antenna beam in gxt format.	B.5.1, B.5.2, B.6.1, B.6.2	S8
25.114 (d)	(4)	A description of the types of services to be provided, and the areas to be served, including a description of the transmission characteristics and performance objectives for each type of proposed service, details of the link noise budget, typical or baseline earth station parameters, modulation parameters, and overall link performance analysis (including an analysis of the effects of each contributing noise and interference source).	B.5.1, B.5.2, B.6.1, B.6.2, B.11, B.12	S6, S11, S12, S13
25.114 (d)	(5)	Calculation of power flux density levels within each coverage area and of the energy dispersal, if any, needed for compliance with §25.208; Calculation of power flux density levels within each coverage area and of the energy dispersal, if any, needed for compliance with §25.208, for angles of arrival other than 5°, 10°, 15°, 20°, and 25° above the horizontal.	B.14	S13
25.114 (d)	(14)	A description of the design and operational strategies that will be used to mitigate orbital debris.	B.20	
25.114 (d)	(14)(i)	A statement that the space station operator has assessed and limited the amount of debris released in a planned manner during normal operations, and has assessed and limited the probability of the space station becoming a source of debris by collisions with small debris or meteoroids that could cause loss of control and prevent post-mission disposal.	B.20	
25.114 (d)	(14)(ii)	A statement that the space station operator has assessed and limited the probability of accidental explosions during and after completion of mission operations. This statement must include a demonstration that debris generation will not result from the conversion of energy sources on board the spacecraft into energy that fragments the spacecraft. Energy sources include chemical, pressure, and kinetic energy. This demonstration should address whether stored energy will be removed at the spacecraft's end of life, by depleting residual fuel and leaving all fuel line valves open, venting any pressurized system, leaving all batteries in a permanent discharge	B.20	

Rule	Sub-part	Information Requested	Technical Appendix Reference	Schedule S Reference
		state, and removing any remaining source of stored energy, or through other equivalent procedures specifically disclosed in the application.		
25.114 (d)	(14)(iii)	A statement that the space station operator has assessed and limited the probability of the space station becoming a source of debris by collisions with large debris or other operational space stations.	B.20	
25.114 (d)	(iv)	A statement detailing the post-mission disposal plans for the space station at end of life, including the quality of fuel — if any —that will be reserved for post-mission disposal maneuvers.	B.20	
25.140 (b)	(2)	An interference analysis to demonstrate the compatibility of its proposed system 2 degrees from any authorized space station.	B.19	
25.143 (b)	(2)(iv)	That a system using geostationary orbit satellites, at a minimum, be capable of providing mobile satellite services on a continuous basis throughout the 50 states, Puerto Rico, and the U.S. Virgin Islands, if technically feasible.	B.1, B.3	S6
25.202 (d)		Space station frequency tolerance.	B.9	S17
25.202 (f)	(1), (2) & (3)	Emission limitations.	B.9	S17
25.204(f)		Operations at 13.75 – 14.0 GHz.	B.11.2, B.20	
25.207		Cessation of emissions.	B.15	
25.210 (f)		All space stations in the Fixed-Satellite Service in the extended Ku band shall employ state-of-the-art full frequency reuse through either orthogonal polarizations within the same beam and/or the use of spatially independent beams.	B.4, B.5.1, B.6.1	S9, S10
25.210 (c)		Minimum capability of changing transponder saturating flux densities by ground command in 4 dB steps over a range of 12 dB.	B.7	S7
25.208(b)		Pfd at earth's service	B.14	
25.210 (i)		FSS space station antennas must be designed to provide a cross-polarization isolation such that the ratio of the on-axis co-polar gain to the cross-polar gain of the antenna shall be at least 30 dB within its primary coverage area.	B.5.1, B.6.1	S7
25.210 (j)		Space stations operated in the geostationary satellite orbit must be maintained within 0.05° of their assigned orbital longitude in the east/west direction.	B.13	S3
25.283 (a)		End-of-life disposal	B.21	
25.283 (c)		Upon completion of any relocation authorized by paragraph (b) of this section, or any relocation at end-of-life specified in an authorization, or upon a spacecraft otherwise completing its authorized mission, a space station licensee shall ensure, unless prevented by technical failures beyond its	B.21	

Rule	Sub-part	Information Requested	Technical Appendix Reference	Schedule S Reference
		control, that all stored energy sources on board the satellite are discharged, by venting excess propellant, discharging batteries, relieving pressure vessels, and other appropriate measures.		


Schedule_S - [Schedule S]
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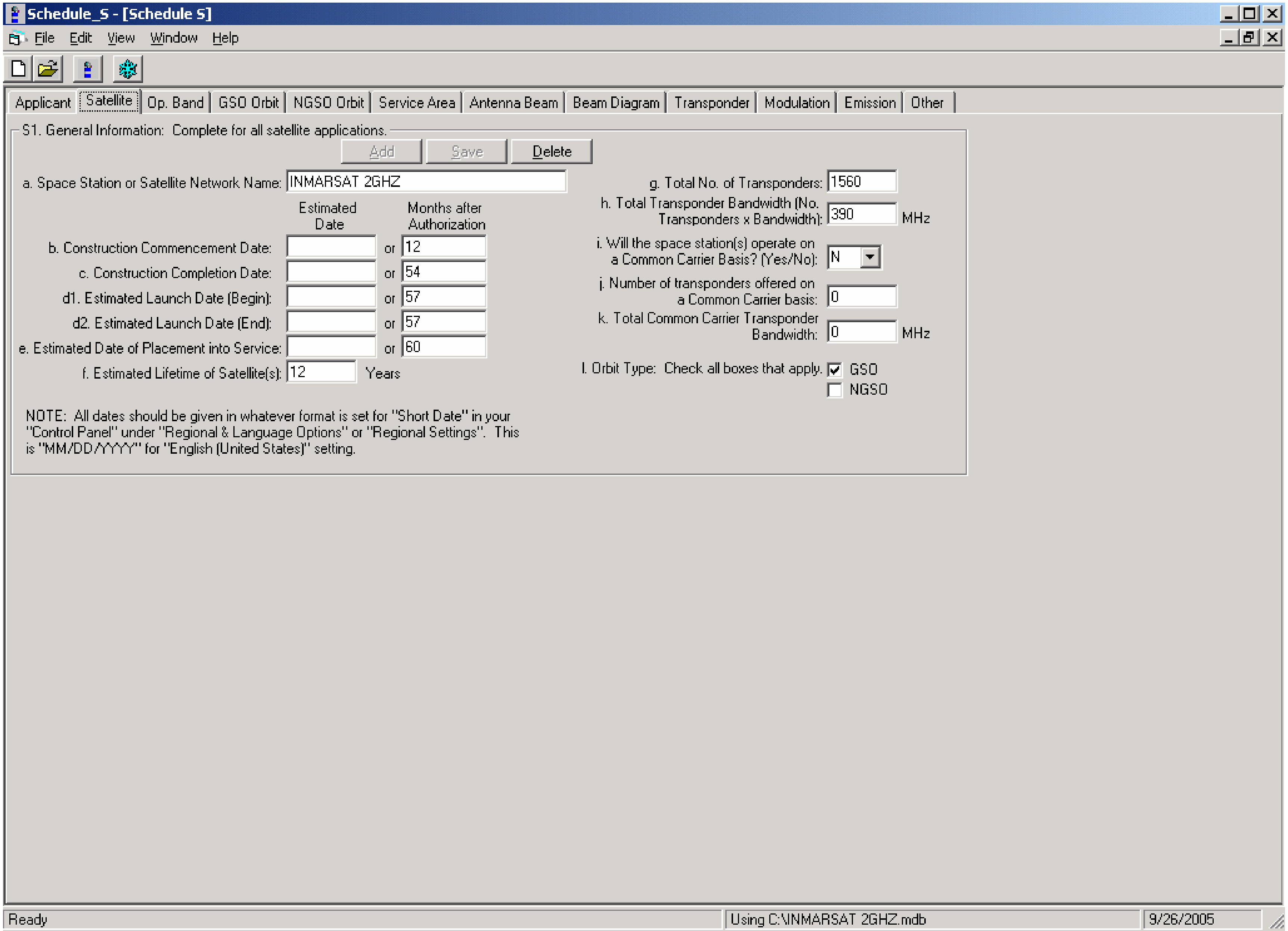
Applicant Satellite Op. Band GSO Orbit NGSO Orbit Service Area Antenna Beam Beam Diagram Transponder Modulation Emission Other
Applicant Information:
Add Save Delete
Name: Inmarsat Global Limited
Street: 99 City Road
Street:
City: London
State:
Zipcode: EC1Y IAX
Country: GBR
Phone Number: 44-20-7728-1000
Fax Number: 44-20-7728-1602
E-mail: Rupert_Pearce@Inmarsat.com
Attention: Rupert Pearce
Note: Begin new data entry by first clicking "Add" button. Click "Save" button when finished.
Revise existing data by editing any data field. Click "Save" button when finished.
GENERAL NOTE: Several tables (Applicant, FCC Only, Satellite, GSO, NGSO Header, Electrical, and Physical) only allow one (1) data row each.
All of these tables have "Add/Save/Delete" buttons that must be used to control data entry and storage. All other "Grid" tables allow multiple rows
of data, each of which is "Saved" by moving the cursor into a different data row.
FCC Only:
Add Save Delete
Call Sign:
File Number (without dashes):
(i.e. SATLOA2004013101234)
Date Filed:
Satellite Alias Name:
ITU Network Name:
Complete this information only if requested
by FCC Staff with respect to a previously
filed application.
Ready
Using C:\INMARSAT 2GHZ.mdb
9/26/2005


Schedule_S - [Schedule S]
File Edit View Window Help
Applicant
Satellite
Op. Band
GSO Orbit
NGSO Orbit
Service Area
Antenna Beam
Beam Diagram
Transponder
Modulation
Emission
Other
S1. General Information: Complete for all satellite applications.
Add
Save
Delete
a. Space Station or Satellite Network Name: INMARSAT 2GHZ
Estimated Date
Months after Authorization
b. Construction Commencement Date: or 12
c. Construction Completion Date: or 54
d1. Estimated Launch Date (Begin): or 57
d2. Estimated Launch Date (End): or 57
e. Estimated Date of Placement into Service: or 60
f. Estimated Lifetime of Satellite(s): 12 Years
g. Total No. of Transponders: 1560
h. Total Transponder Bandwidth (No. Transponders x Bandwidth): 390 MHz
i. Will the space station(s) operate on a Common Carrier Basis? (Yes/No): N
j. Number of transponders offered on a Common Carrier basis: 0
k. Total Common Carrier Transponder Bandwidth: 0 MHz
l. Orbit Type: Check all boxes that apply. GSO
NGSO
NOTE: All dates should be given in whatever format is set for "Short Date" in your "Control Panel" under "Regional & Language Options" or "Regional Settings". This is "MM/DD/YYYY" for "English (United States)" setting.
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Schedule_S - [Schedule S]

File Edit View Window Help

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S2. OPERATING FREQUENCY BANDS

For each frequency band in which the satellite will operate, provide:

a.Lower Frequency Limit (numeric)	b.Unit (_Hz)*	c.Upper Frequency Limit (numeric)	d.Unit (_Hz)*	e.T/R Mode **	f.Nature of Service
2000	M	2020	M	R	
2180	M	2200	M	T	
13.8	G	14.0	G	R	
11.5	G	11.7	G	T	
13.9973	G	13.9987	G	R	
11.69791	G	11.69809	G	T	

S2f. Nature of Service(s): To edit, click button in column "f" of table S2

Lower Frequency Limit (MHz)	Upper Frequency Limit (MHz)	T/R Mode	f.Nature of Service	Description
2000	2020	R	MSS	Mobile-Satellite Service
2180	2200	T	MSS	Mobile-Satellite Service
13800	14000	R	FMSS	Feeder Link for Mobile Satellite Service in FSS
11500	11700	T	FMSS	Feeder Link for Mobile Satellite Service in FSS
13997.3	13998.7	R	FSS	Fixed Satellite Service
11697.91	11698.09	T	FSS	Fixed Satellite Service

NOTES: * Use "K", "M", or "G" to denote "kHz", "MHz", or "GHz".
** Use "T" for "Transmit" and "R" for "Receive"

To delete an Operating Band: (1) click in any column in the row of table S2, (2) then click at the left sidebar of row to be deleted. This highlights the entire row.
(3) Finally press "Delete" key on keyboard. GENERAL NOTE: This general process also applies to deleting rows in any of the GRID tables on the other tabs.

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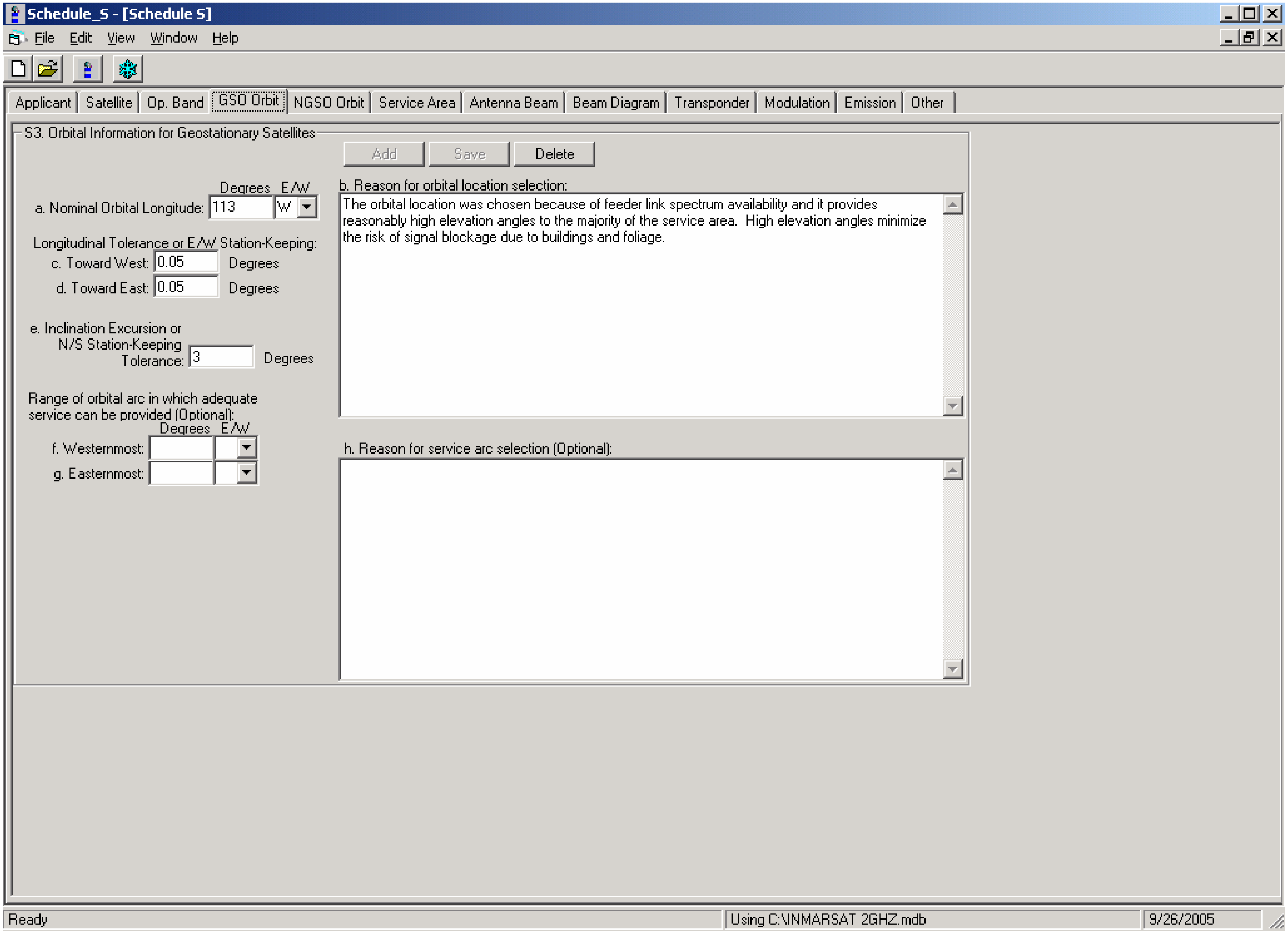
Schedule_S - [Schedule S]
File Edit View Window Help
Applicant
Satellite
Op. Band
GSO Orbit
NGSO Orbit
Service Area
Antenna Beam
Beam Diagram
Transponder
Modulation
Emission
Other
S3. Orbital Information for Geostationary Satellites
Add
Save
Delete
Degrees E/W
a. Nominal Orbital Longitude: 113 W
b. Reason for orbital location selection:
The orbital location was chosen because of feeder link spectrum availability and it provides reasonably high elevation angles to the majority of the service area. High elevation angles minimize the risk of signal blockage due to buildings and foliage.
Longitudinal Tolerance or E/W Station-Keeping:
c. Toward West: 0.05 Degrees
d. Toward East: 0.05 Degrees
e. Inclination Excursion or N/S Station-Keeping Tolerance: 3 Degrees
Range of orbital arc in which adequate service can be provided (Optional):
Degrees E/W
f. Westernmost:
g. Easternmost:
h. Reason for service arc selection (Optional):
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Schedule_S - [Schedule S]

File Edit View Window Help

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S6. Service Area Characteristics

For each Service Area provide:

	a. Service Area ID	b. Type of Assoc. Station ('E'arth or 'S'pace)	c. Service Area Diagram File Name (GXT File)	d. Service Area Description. State Codes, ITU Codes, or Figure No.	Service Area Diagram File Name (Pdf File)
▶	SA1	S		CONUS, Alaska, Hawaii, Puerto Rico, U.S. Virgin Islands	
	SA2	S		CONUS	
*					

NOTE: Double-Click anywhere on the service area row to view the service area GXT file.
Double-Click in PDF column to view the PDF file for the service area row.

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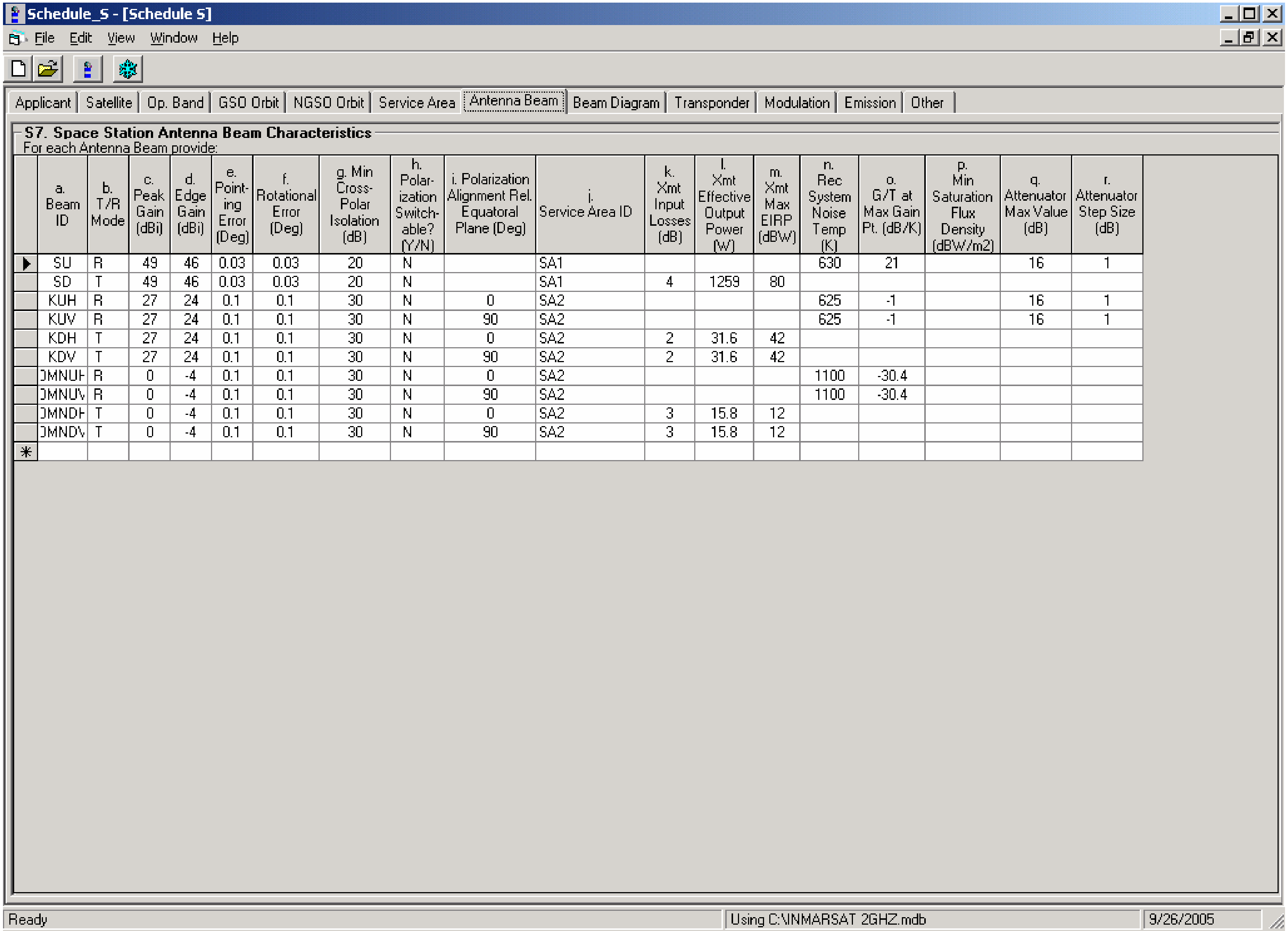
Schedule_S - [Schedule S]

File Edit View Window Help

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S7. Space Station Antenna Beam Characteristics

For each Antenna Beam provide:

a. Beam ID	b. T/R Mode	c. Peak Gain (dBi)	d. Edge Gain (dBi)	e. Pointing Error (Deg)	f. Rotational Error (Deg)	g. Min Cross-Polar Isolation (dB)	h. Polarization Switchable? (Y/N)	i. Polarization Alignment Rel. Equatoral Plane (Deg)	j. Service Area ID	k. Xmt Input Losses (dB)	l. Xmt Effective Output Power (W)	m. Xmt Max EIRP (dBW)	n. Rec System Noise Temp (K)	o. G/T at Max Gain Pt. (dB/K)	p. Min Saturation Flux Density (dBW/m2)	q. Attenuator Max Value (dB)	r. Attenuator Step Size (dB)
SU	R	49	46	0.03	0.03	20	N		SA1				630	21		16	1
SD	T	49	46	0.03	0.03	20	N		SA1	4	1259	80					
KUH	R	27	24	0.1	0.1	30	N	0	SA2				625	-1		16	1
KUV	R	27	24	0.1	0.1	30	N	90	SA2				625	-1		16	1
KDH	T	27	24	0.1	0.1	30	N	0	SA2	2	31.6	42					
KDV	T	27	24	0.1	0.1	30	N	90	SA2	2	31.6	42					
OMNUH	R	0	-4	0.1	0.1	30	N	0	SA2				1100	-30.4			
OMNUV	R	0	-4	0.1	0.1	30	N	90	SA2				1100	-30.4			
OMNDH	T	0	-4	0.1	0.1	30	N	0	SA2	3	15.8	12					
OMNDV	T	0	-4	0.1	0.1	30	N	90	SA2	3	15.8	12					

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Schedule_S - [Schedule S]

File Edit View Window Help

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S8. ANTENNA BEAM DIAGRAMS

For each beam pattern provide the reference to the graphic image and numerical data:
Also provide the power flux density levels in each beam that result from the emission with the highest power flux density.

a. Beam ID	b. T/R Mode	c. Co- or Cross-Polar Mode (C or X)	d. GSO Ref. Orbital Longitude (deg E)	e. NGSO Antenna Gain Contour Description (Figure/Table/Exhibit)	f. GSO Antenna Gain Contour Data (GXT format)	g. Max PFD @ 5 deg* (dBW/m2 per ref. Bandwidth)	h. Max PFD @ 10 deg* (dBW/m2 per ref. Bandwidth)	i. Max PFD @ 15 deg* (dBW/m2 per ref. Bandwidth)	j. Max PFD @ 20 deg* (dBW/m2 per ref. Bandwidth)	k. Max PFD @ 25 deg* (dBW/m2 per ref. Bandwidth)	l. PFD Ref. BandWidth (4kHz or 1MHz)
SU	R	C	-113		SU.GXT						
SD	T	C	-113		SD.GXT						
KUH	R	C	-113		KUH.GXT						
KUV	R	C	-113		KUV.GXT						
KDH	T	C	-113		KDH.GXT	-160.7	-160.4	-160.1	-159.8	-159.5	4kHz
KDV	T	C	-113		KDV.GXT	-160.7	-160.4	-160.1	-159.8	-159.5	4kHz
MNU	R	C	-113								
MNU'	R	C	-113								
MND	T	C	-113			-165.8	-165.8	-165.8	-165.8	-165.8	4kHz
MND'	T	C	-113			-165.8	-165.8	-165.8	-165.8	-165.8	4kHz

NOTE: Double-Click anywhere on the diagram row to view the diagram PDF.
Double-Click in GXT column to view the GXT file for the row.

*@ X deg., where X is the Angle of Arrival above horizontal

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Schedule_S - [Schedule S]

File Edit View Window Help

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S9. Space Station Channels

a. Channel ID	b. Assigned Bandwidth (kHz)	c. T/R Mode	d. Center Frequency (MHz)	e. Polar-ization	f. TT&C or Comm
SU01	20000	R	2010	R	C
SD01	20000	T	2190	R	C
UL01	195000	R	13897.5	H	C
UL02	195000	R	13897.5	V	C
DL01	195000	T	11597.5	H	C
DL02	195000	T	11597.5	V	C
TC01	1400	R	13998	H	T
TC02	1400	R	13998	V	T
TC03	1400	R	13998	H	T
TC04	1400	R	13998	V	T
TM01	180	T	11698	H	T
TM02	180	T	11698	V	T
TM03	180	T	11698	H	T
TM04	180	T	11698	V	T

S10. Space Station Transponders

a. Trans-ponder ID	b. Trans-ponder Gain (dB)	c. Receive Channel ID	d. Receive Beam ID	e. Transmit Channel ID	f. Transmit Beam ID
FL01	140	UL01	KUH	SD01	SD
FL02	140	UL02	KUV	SD01	SD
RL01	140	SU01	SU	DL01	KDH
RL02	140	SU01	SU	DL02	KDV
TC01		TC01	KUH		
TC02		TC02	KUV		
TC03		TC03	OMNUH		
TC04		TC04	OMNUV		
TM01				TM01	KDH
TM02				TM02	KDV
TM03				TM03	OMNDH
TM04				TM04	OMNDV

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Schedule_S - [Schedule S]

File Edit View Window Help

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S11. Digital Modulation Parameters

a. Digital Mod. ID	b. Emission Designator	c. Assigned Bandwidth (kHz)	d. No. of Phases	e. Uncoded Data Rate (kbps)	f. FEC Error Correction Coding Rate	g. CDMA Processing Gain (dB)	h. Total C/N Performance Objective (dB)	i. Single Entry C/I Objective (dB)
D1	500KG7W	500	4	160	0.25		-2.5	30
D2	500KG7W	500	4	320	0.5		1.1	27.3
D3	500KG7W	500	8	640	0.67		6.7	26.9
D4	500KD7W	500	16	960	0.75		10.3	26.8
D5	62K5G7W	62.5	4	20	0.25		-2.5	21.1
D6	125KG7W	125	4	80	0.5		1.1	24.8
D7	250KG7W	250	4	240	0.75		4.1	27.9
D8	500KD7W	500	8	720	0.75		8	32.1

S12. Analog Modulation Parameters

a. Analog Mod. ID	b. Emission Designator	c. Assigned Bandwidth (kHz)	d. Signal Type	e. Channels per Carrier	f. Ave. Com-panded Talker Level (dBm0)	g. Telephony Bottom Baseband Freq (MHz)	h. Telephony & SCPC/FM Top Baseband Freq (MHz)	i. Telephony RMS Modulation Index	j. Video Standard (NTSC, PAL, etc.)	k. Video Noise Weighting (dB)	l. Video & SCPC/FM Modulation Index	m. SCPC/FM Compander, Pre-emphasis, & Noise Weighting (dB)	n. Total C/N Performance Objective (dB)	o. Single Entry C/I Objective (dB)
A1	1M40F3X	1400		1									11	23.2
A2	1M40F3X	1400		1									11	23.2
A3	180KG3X	180		1									11	23.2
A4	180KG3X	180		1									11	23.2

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Schedule_S - [Schedule S]

File Edit View Window Help

Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S13. TYPICAL EMISSIONS

For each planned type of emission provide:

a. Assoc. Trans-ponder ID (Start)	b. Assoc. Trans-ponder ID (End)	c. Digital Mod. ID	d. Analog Mod. ID	e. Carriers per Trans-ponder	f. Carrier Spacing (kHz)	g. Noise Budget Reference	h. Disperal Band-width (kHz)	i. Assoc. XMT Stn Max Antenna Gain (dBi)	j. Assoc. Stn Min. XMT Power (dBW)	k. Assoc. Stn Max. XMT Power (dBW)	l. Min. EIRP (dBW)	m. Max. EIRP (dBW)	n. Max. PFD (dBW/m2)	o. PFD Ref. BndWdth (4kHz or 1MHz)	p. Assoc. Stn Rec. G/T (dB/K)
FL01	FL02	D1		390	500	FL-HH.doc		60.5	-0.2	2.8	51	54			-28
FL01	FL02	D2		390	500	FL-PM.doc		60.5	-2.8	0.2	48.3	51.3			-23
FL01	FL02	D3		390	500	FL-PT.doc		60.5	-3.2	-0.2	47.9	50.9			-17
FL01	FL02	D4		390	500	FL-NB.doc		60.5	-3.3	-0.3	47.7	50.7			-12
RL01	RL02	D5		3120	62.5	RL-HH.doc		-6	-0.9	2.1	-3.2	-0.2	-174.3	4kHz	37
RL01	RL02	D6		1560	125	RL-PM.doc		-1	-0.7	2.3	3.5	6.5	-170.6	4kHz	37
RL01	RL02	D7		780	250	RL-PT.doc		5	-1.6	1.4	9.6	12.6	-167.5	4kHz	37
RL02	RL02	D8		166	500	RL-NB.doc		10.8	-1.2	1.8	16.8	19.8	-163.3	4kHz	37
TC01	TC02		A1	1		TC-LB.doc		60.5	7.5	8.5					-4
TC03	TC04		A2	1		TC-OMN.doc		60.5	22.5	24.5					-30.4
TM01	TM02		A3	1		TM-LB.doc					17	20	-158.2	4kHz	37
TM03	TM04		A4	1		TM-OMN.do					8	12	-165.8	4kHz	37

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Applicant | Satellite | Op. Band | GSO Orbit | NGSO Orbit | Service Area | Antenna Beam | Beam Diagram | Transponder | Modulation | Emission | Other

S14. TT&C Station Locations

Is the space station(s) controlled and monitored remotely? Yes Save

Complete Satellite Tab before responding to Yes/No Question S14.

	a1. Street1 Address	a2. Street2 Address	b. City	c. County	d1. State	d2. Country	e. Zip Code	f. Telephone No.	g. Call Sign of Control Station
*									

S15. SPACECRAFT PHYSICAL CHARACTERISTICS

Add Save Delete

a. Mass of spacecraft w/o fuel: 4200 kg

b. Mass of fuel & disposables at launch: 3300 kg

c. Mass of spacecraft & fuel at launch: 7500 kg

d. Mass of fuel, in orbit, at BOL: 500 kg

e. Deployed area of Solar Array: 113 sq. meters

Spacecraft Dimensions - Deployed on-orbit (meters)

f. Length: 22 m

g. Width: 56 m

h. Height: 20 m

Probability of Survival to End of Life (0-1)

i. Payload: 0.74

j. Bus: 0.89

k. Total: 0.66

S16. SPACECRAFT ELECTRICAL CHARACTERISTICS

Add Save Delete

Spacecraft Subsystem	Electrical Power (Watts) @ BOL @ Equinox	@ Solstice	Electrical Power (Watts) @ EOL @ Equinox	@ Solstice
Payload (Watts): a.	14000	f. 14000	k. 14000	p. 14000
Bus (Watts): b.	1200	g. 800	l. 1200	q. 800
Total (Watts): c.	15200	h. 14800	m. 15200	r. 14800
Solar Array (Watts): d.	17800	i. 16700	n. 16900	s. 15300
Depth of Battery Discharge (%): e.	72	j.	o. 72	t. 72

S17. CERTIFICATIONS

Save

Complete Satellite Tab before responding to S17 Certifications.

a. Are the power flux density limits of § 25.208 met? Yes

b. Are the appropriate service area coverage requirements of § 25.143(b)(ii) and (iii), or § 25.145(c)(1) and (2) met? n/a

c. Are the frequency tolerances of § 25.202(e) and the out-of-band emission limits of § 25.202(f)(1), (2), and (3) met? Yes

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